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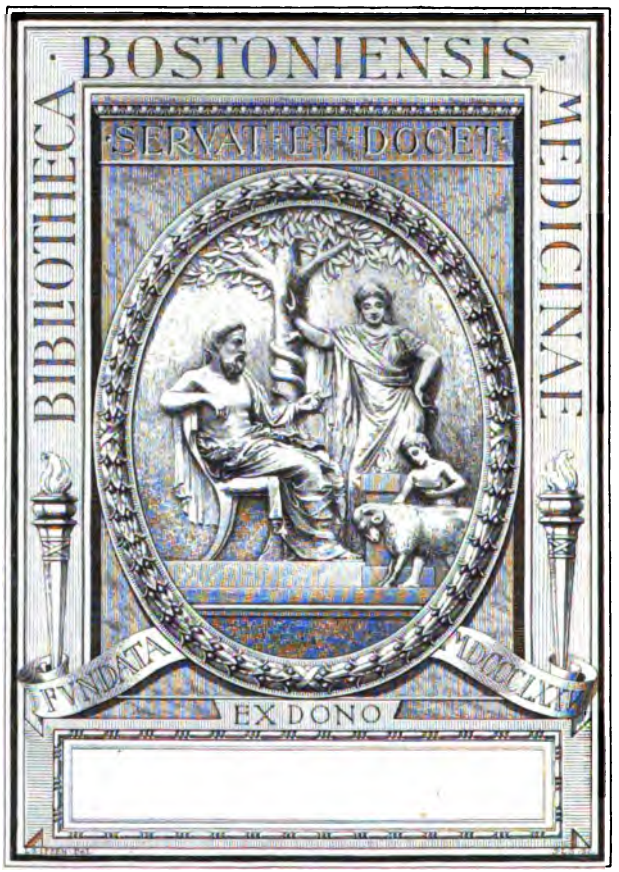
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Dr SINCLAIR, Dundee.

EDITED BY

NORMAN WALKER, M.D., F.R.C.P.

AND

HAROLD J. STILES, M.B., F.R.C.S.

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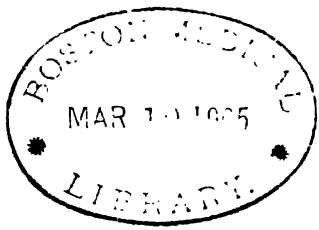
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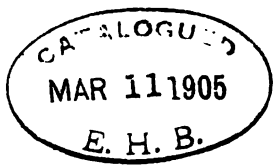
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THE SCOTTISH
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TUBERCULOSIS—ITS PREVENTION AND TREATMENT. THE WORK OF LOCAL CENTRES ALL OVER THE COUNTRY

By DAVID H. STIRLING, M.D.

THE recent International Congress held in Edinburgh has awakened fresh interest in the question of prevention, care and treatment of tuberculosis. A short account of a local effort may be of interest. When a student in Edinburgh in the last of the forties and the early fifties of last century, our revered teacher Sir Wm. Gairdner, still among us in honoured age, often demonstrated in the pathological theatre of the old Royal Infirmary that phthisis, as it was then called, is a curable disease. I think I see these cicatricial puckerings in the lungs then shown to us, to this day. They live in memory. That teaching has never been forgotten. Consumption not necessarily fatal—many ill in youth and middle life dying of other diseases in old age. Amid numberless disappointments, the lessons of the great master have stimulated effort to combat the plague. From the year 1876 pulmonary tuberculosis has been included among the chronic ailments treated in a small hospital in the neighbourhood of the city of Perth. Long before the infectious nature of the disease was fully admitted, it was found desirable to separate phthisical patients from the other inmates, because of the disturbance to quiet and restfulness caused by cough and other distressing symptoms. As soon as the true character of the disease became known, measures were at once taken to deal with it as an infectious and preventable malady. Full open-air treatment was welcomed and adopted.

Public health considerations have occupied a prominent place in the work of the hospital. Preventive measures go hand in hand with treatment of individuals. No enquiry was required to demonstrate the alarming extent of the disease in town and

country. The public have, however, been slow to realise the true state of matters, nor do they yet, or it may be that the universality of the scourge paralyses effort.

For many years the milder and severer cases were treated under the same roof, no other accommodation being provided. The method was found extremely faulty, but open-air treatment did wonders. Three years ago a beautifully situated and well equipped Sanatorium was provided and handed over to the Society by Sir Robert and the late Lady Pullar. The whole work is carried on on strictly philanthropic lines, supported principally by voluntary gifts. A small weekly payment is required in order to prevent the influx of persons who are more properly cared for by Parish Councils, but no deserving applicant is refused when sufficient contribution is forthcoming from a public fund. Persons admitted from beyond the county are required to pay cost of maintenance.

The principal obstacle to successful preventive measures is the condition of many densely populated localities. Lanes, closes, blind alleys, courts of all sorts and sizes abound. Into many houses no ray of sunshine enters. Public improvements clear out dens, and not seldom expensive business premises take their place. Large blocks of tenement houses are erected, from a health point of view bad, favouring the spread of infectious disease, in no way conducive to moral or physical well-being. Air certainly blows up, for the most part, well lighted staircases, and over wide platforms, even this by no means an unmixed blessing when dust is carried with every gust of wind. The young children reared in these barracks may pass half their young life indoors, or behind their platform railing. In dealing with the old rookeries, sanitary inspectors' reports may tell of white-washed closes and good drainage, when non-official eyes see dirt, darkness, broken plaster, airless dark holes, in nearly all our poorer districts, occupied by human beings old and young, in which physical deterioration and moral pollution develop together.

Eminent physicians in Belgium, France and Germany unite with our own colleagues at home in the opinion that the endeavour to develop resisting constitutions is the prime service to be rendered. They are right, and to effect this no means should be left untried. But it is surely a retrograde policy to advocate the treatment of consumption itself in the very places where it springs, and is daily fed with fresh victims. Difficulties in the way of removing large numbers of infected persons to sanatoria, or when seriously ill to Homes for the more advanced cases are many, but if no other plan is safe for the community they must be overcome somehow. A few may

be treated at home under careful supervision where there are no young children and no crowding near. The lot of the seriously afflicted would be in a large majority of cases pitiable. Week after week hardly, if ever, looking on the clear sky or on a green field, the weary cry would ever be,

"Carry me out
Into the wind and the sunshine,
Into the beautiful world."

Fresh air blows through factories: what of our home industries as carried on in dwelling-houses and shops, heated by human respiration; the shelves, old clothes repairing, and new in the making, receiving and retaining unclean dust. Bacilli factories are everywhere to this day in city, town and country. Without united and unceasing effort to put an end to this our labour is vain.

To combat the disease in large cities an intelligence and educational centre would be of inestimable value.

With earnest and tactful visitors working along with the medical practitioners, every case of tuberculosis could be known and dealt with according to its circumstances and surroundings. General principles of action decided on, all details would follow in natural course. Compulsory notification is the cry of many, professional and lay: it appears to me an utterly unworkable idea. All arguments for and against have been advanced, and are known to all.

Educational agencies carried on in halls of all kinds form an important part of "Preventive Work." This might with advantage be extended here, and widely adopted. Much useful information can be communicated by aid of lantern slides and black-board demonstrations. They form subject of conversation afterwards, and are evidently appreciated.

It is well known that there are always large numbers of people not yet infected, fast drifting into that condition of ill-health that renders them peculiarly receptive of the poison that generates tuberculosis: a large proportion of these are indoor workers. They require to get outside when the day's work is over, and stay outside till it is resumed. Two years ago a "Rest House" was opened within a mile of the business part of the city, situated on a beautiful hillside among broom and wild nature. To this, persons requiring change from small houses and airless localities, and hundreds do, were invited to retire when the day's work was over, to rest amid scenes of healthful beauty not excelled in the Highlands of Scotland. Every provision was made for their comfort and supervision; far removed as it is from any house: week-end residence was an

additional inducement. There has been no response. The plan as a preventive of disease has met with universal approval from all except those to whom the privilege is offered.

A recommendation from a medical practitioner is alone required. Is the place shunned because it is within the grounds of the Sanatorium? It may be so. It seems a reasonable hopeful method as a preventive of tuberculosis, and as such we commend it to the consideration of employers who have the best interests of workers at heart. It might be extensively adopted at very little cost.

One great difficulty in dealing with "Consumption" is, that the disease has got firm hold in most cases before work is laid aside, bad surroundings left, and open-air treatment sought. As yet we have no other means of combating the disease. "Home treatment" among the poor is disastrous. Three months, day and night, in the open air, would bring about hopeful convalescence in multitudes of cases for whom the cough mixture, tonics and antiseptics of the Dispensary can do little or nothing.

We wait in hope on the work of the invaluable "Research Scientists," and confidently expect that it will be rewarded by the discovery of some antitoxin, safe and effective. Till then our one remedy is open air, and such common-sense methods of so improving general health and healing local injury, as to render the human soil unsuitable for the life and growth of the deadly parasite.

The condition in which many patients are sent to us renders all chance of recovery hopeless, but nearly all improve for a time. None are too far gone to receive benefit who are not actually dying rapidly. The worst are welcome to "The Cottage," the Home for advanced cases.

None such are suitable as inmates of the Sanatorium: but it is to it they are sent by their doctor, and only to it will they come. We look to our colleagues for help in this difficulty. Gentle remonstrance with some medical friends has been met with the reply, "If you won't take these cases, you'll get none." We hope for better things. The so-called early stage is difficult to define, but a mass of consolidation in all *stages* of *local change* with high temperature and flying pulse can by no fair interpretation of signs be called an early stage. Periods of intermittent progress are deceiving, and these may be found in perfectly hopeless cases.

The purpose of this paper, "a short account of a local effort to deal with Tuberculosis," will be accomplished if it leads to the establishment of similar local organisations on such special lines as local circumstances may dictate.

A few big hospitals erected by municipalities and supported by "rates" seems an easy way out of the difficulty. Tack on "Home treatment," place all under the charge of the Medical Officer of Health, and have done with the subject. We hope for other methods, and can speak favourably of our own.

The strictly medical treatment and its results we may perhaps be allowed to communicate on some future occasion.

LUPUS, CARCINOMA AND X-RAYS[1]

By NORMAN WALKER, M.D., etc.

LADIES AND GENTLEMEN,—The fact that I have at present under observation no fewer than four cases of Lupus in which Carcinoma has developed, has naturally led me to give the subject careful consideration, especially in view of the suggestion that the treatment adopted might possibly be responsible for the complication.

The following are the cases:—

CASE I. James S., aged 32, when two years old, had tuberculous glands, which broke down. Lupus developed in the scar, and spread slowly and steadily. When a boy he was scraped several times in the Royal Infirmary. Latterly there has been no active treatment for the lupus, which has spread as is shown in the photograph, causing considerable destruction of both ears. Eighteen months ago a lump appeared in the centre of his left cheek, and gradually enlarged until it reached the size shown in the illustration, which was taken on April 5th. On examination, two nodules were found on the other cheek. They were hard, about the size of a pea: the surface was hyperkeratotic; there was no papillomatous development. Since April 5th he has had fifty exposures to the X-rays, with the result shown in the second photograph, taken June 27th. The lupus has also benefitted considerably.

CASE II. James B., aged 26, has had lupus for 12 years. It is said to have begun on the upper lip, and in March 1902 affected almost the whole of his face. From that date he was under treatment by the Rays more or less continuously, except when the treatment had to be stopped for reaction. There were frequent applications of carbolic acid and chloride of antimony.

[1] A Clinical Lecture delivered in the Royal Infirmary, June 7th, 1904.

On February 23rd, 1904, a small crust was observed at the right side of the nose. This was assumed to be due to reaction; salve muslin was applied and the Rays stopped. The patient returned on March 1st with a lump the size of a hazel nut obviously epitheliomatous, which was removed on March 4th by Professor Annandale. It healed well, and there has been no recurrence.

CASE III. James B., about 38, is of special interest to me, as he has been more or less under my observation for long. He came under my care in 1900 suffering from very extensive lupus, which practically involved all the skin of the head and neck, except that of the scalp. He was horribly disfigured, and used to muffle his face when compelled to be out of doors. There was so much crusting that he was quite unable to wear a collar. He was under my care for nearly two years getting exposure to the Rays about once a week (he lived in Glasgow). When the electro-therapeutic pavilion was opened in the Glasgow Royal Infirmary, I transferred him for further treatment there. He made himself useful, and gradually became a sort of supernumerary in the department. Having the run of the place he seems to have revelled in the opportunity, and he had X-rays, Finsen light, high frequency, and static electricity, one or other almost daily since March 1902. The improvement in his general condition is wonderful. In October 1903 he first noticed a slight *warty* growth on his cheek. At first it grew slowly, but since December, when he became an assistant in the pathological department, it has grown more rapidly, and was in May of the size shown in the photograph.

CASE IV. Christina M., aged 46. The lupus began at the age of ten, in the centre of the right cheek and spread slowly. When twenty years of age she was treated by the late Dr John Duncan, who scarified the face at least twenty times at intervals of two or three days. The result was very satisfactory and there was no extension of the disease for some time. Then it began to spread again, but no treatment was carried out; she lived in the Highlands, miles from any doctor. She came to the Infirmary in October 1902, when she had a very extensive eruption of lupus affecting practically the whole face. She was treated by the Rays for five minutes three times weekly, with intervals for reaction. She went home in March 1903 considerably improved, and returned in June for further treatment, which was applied daily for about two months. Early in April 1904 she noticed a little scab on the side of the nose. This bled readily, and she put on starch poultices, which brought out "proud flesh." The

FIG. 1.

CASE 1. April 5.

FIG. 2.

CASE 1. June 27.

FIG. 3.

CASE 3. May 1904.

PLATE I.—TO ILLUSTRATE DR NORMAN WALKER'S LECTURE.

growth seems to have been very rapid, but caused no pain. Fortunately she was seen by my friend, Dr Haultain, who was fishing in the neighbourhood, and who reported to me that it "looked exactly like cancer of the cervix felt." He advised her to come at once to the Infirmary, and Mr M'Gillivray kindly admitted her to his ward, where she had been during her previous treatment, and I have to thank him for his permission to make use of the case. Since admission there has been no marked increase in size, but she is quite definite in her statement that the growth was at first much more rapid.

The development of Cancer on Lupus is no new thing. Cases have been described by observers in all parts of the world, and there are probably over 200 cases on record, while from my own personal experience I know that there must be very many unrecorded. Among the many papers on the subject, none contains so much information and gives so clear a summary of the observations of others as that of Ashihara, who, writing in 1901, was able to give pretty full particulars of no fewer than 122 cases. You will understand, of course, that these are not his own cases. His work was done in Neisser's clinic and three cases form the foundation of his paper.

In looking up the text-books one finds differences of opinion in reference to the frequency of the complication. Thus *Crocker* says, Epithelioma occurs in 2 per cent of all cases. *Stelwagon* has only seen one case. At the *Dermatological Congress* in London only one case was shown. *Mr Hutchinson* says he has seen fragments of perhaps a dozen cases. I find eight cases recorded by *Kaposi* and five by *Hebra*. Dubois-Havenith is quoted as having observed it five times in 118 cases. Compared with any of these experiences it is obvious that four cases at once is an unusual occurrence, and that some explanation ought to be forthcoming. But statistics, as we have recently seen, are things that require very careful handling. It is true that we work here in a smaller population than the majority of those whose figures I have quoted, but it is to be remembered that the present time is favourable for the assembling of lupus cases. Over 100 cases have been under our supervision in the last two years, some of them cases in which the lupus had lasted for a very long time, and therefore, according to Hutchinson, just the cases

which develop Carcinoma. Still, making every allowance, the occurrence of so many cases is clearly a matter for investigation, if only to satisfy oneself that nothing but coincidence is present.

The majority of authors refer to the complication as one of exceeding gravity. Extensive operations are too often followed by rapid recurrence, which appears to be favoured by the lowered vitality of the lupus tissue. Thirty-one per cent. of the recorded cases were under 40 years of age, and in 90 per cent. of them the cancer occurred on the face.

Some authors endeavour to distinguish between Lupus-Cancer and Lupus-Scar-Cancer, on the ground that in the one class it commences in the lupus tissue proper, and in the other in the scar tissue left after the lupus has been cured. I agree with those who question this distinction. In the *first* place, it is difficult to see how a cancer could develop in the tissue of lupus proper, which is of connective tissue origin ; *secondly*, even if that could be got over, lupus rarely heals so perfectly as to exclude the possibility of small nodules being still present; while, *thirdly*, in the cases which develop on active florid lupus there is every reason to suppose that some scar tissue co-exists.

In the work which I did some years ago on the origin of Rodent Ulcer, I found that there was an occasional history of injury, especially in those in unusual situations, and Hutchinson refers to "scar" cancer as relatively benignant, "like rodent ulcer." The question of the origin of cancer is too large for consideration here, but I believe there is something in that modification of Cohenheim's theory, which looks with suspicion on buried epithelium. This may lie for long periods (or for ever) inactive, but it may at any time begin to grow either in the form of a rodent ulcer or of the benign "Scar Cancer." When sections from certain cases of lupus are examined under the microscope, long processes of epithelium are seen ramifying in the cellular tissue, and these sometimes present an appearance so suggestive of epithelioma that they are often diagnosed as such by enthusiastic young pathologists. It does not require much stretch of imagination to see how, in the process of scarring, portions of these may be cut off from their surface connection and become to all intents and purposes Cohnheim's

"rests," capable at any time of malignant development.[1] Such, I believe, is the explanation of the complication of Lupus by Carcinoma.

Effects of Treatment.

All the authors who refer to the possibility, protest—some, I think, too much—that treatment has nothing to do with the development of the cancer. I am not so sure. It seems to me that scraping—formerly the favourite treatment—may very well be held responsible for the detachment of fragments of epithelium and their burial in the rapidly formed scar tissue. It is often mentioned as a theoretical objection against scraping, that tubercle bacilli may be set free and pass into the circulation, but so far as I know this other possibility has been overlooked. Possibly the caustic methods formerly so much in vogue may have had a similar effect, though I do not think it so likely, while the other methods cannot, I think, be held suspect.

When we come to recent methods, there at once arises the question for the purpose of discussing which I am giving you this lecture, "Can the X-Rays be held liable for the occurrence?"

The fact that the Rays may produce a cancer which has in not a few instances terminated fatally is not so widely advertised in the daily and monthly lay press as is the fact that they can in some cases effect a cure. These cases have, I believe, up to now all been noticed in X-Ray workers. Everyone is familiar with the rough skin, the warty growths and the ragged nails of the Radiographer, and I have some hope that my remarks may lead to greater caution or at least to less foolhardiness among them. These cancers pursue a pretty definite course. They commence with hyperkeratosis (excessive cornification) of the whole exposed skin (usually the hands). Then these develop little black points which are imbedded in the skin, and are so firmly adherent to it that their removal is actually painful. I speak from personal experience. Later,

[1] Allan Jamieson refers to this as "a peculiar form of Lupus described by Kaposi," but I believe some degree of it is far from uncommon, though fortunately the further development is rare.

the epithelium begins to proliferate and a little hard warty epithelioma develops. This, if promptly removed, may never recur; but if neglected, the growth becomes increasingly rapid, the glands become involved, extensive operations are required, which in some instances are ineffectual.

I have described this so fully to point the contrast between it and the form of cancer that develops in lupus. That is often papillomatous in character, but it is not accompanied by the hyperkeratosis of the X-Ray cancer, and all authors are agreed that malignant as it invariably is, metastasis is quite exceptional, and death is due to extension locally.

In the treatment of lupus by X-Rays there is considerable difference of opinion as to whether one should aim at a reaction or not, some holding that the results are more rapid when reaction is produced, others that it should be avoided at all hazards. When a severe reaction, and still more when a burn is produced, there is, it seems to me, an increased probability that fragments of epithelium may be ensnared in the scar, and it seems to me also possible that in the rapid scarring which sometimes takes place without any reaction the same thing may result. Of my four cases, three had had prolonged X-Ray treatment, but in none were burns produced. The case of No. 2 is the only one in which I am inclined to look upon the carcinoma as possibly directly due to the Rays. It appeared during the treatment and in its character resembled the X-Ray form. Fortunately Case 1 had no Ray treatment before the development of the carcinoma, and the very marked improvement which has followed the application of the Rays, the improvement which is also notable in Case 3, seems to indicate that it would be unwise were we to be dissuaded from their use in such cases.

My answer to the question therefore is, that I believe the Rays may be answerable indirectly for the development of cancer, in that they hasten the scarring process which one aims at, and thus do in an indirect way increase the chances of the development of carcinoma. But that it is indirectly that they act is, I think, strongly supported by the fact that perseverance in the treatment, a course requiring at first some courage, may directly cure the condition which it has indirectly

produced. Not that I believe that this is the best treatment. If cases are recognised at their earliest stage the knife should be used. When, however, they have reached extensive development, experience shows that the prognosis of operated cases is grave, and recourse may then be had to the Rays.

GLAUCOMA AND THE GLAUCOMA THEORIES[1]

By J. V. PATERSON, M.A., F.R.C.S.,
Assistant Ophthalmic Surgeon to the Royal Infirmary ;
Surgeon, Eye Infirmary, Cambridge Street, Edinburgh

THE questions involved in the study of intra-ocular tension are so complex and so intimately bound up with the physiology and pathology of other parts of the body that it would only be presumption or ignorance on my part which could lead me to attempt their full elucidation. No subject in Ophthalmology has been more diligently studied or more fully discussed. When I mention that Professor Leber in his latest monograph on the circulation and nutrition of the eyeball tabulates no less than the astounding number of 1328 separate articles, many of them of great length, you can form some idea of the enormous amount of work already done. I would rather this evening, remembering that I am not addressing a society of ophthalmologists, seek to interest you in the study, first of normal intra-ocular tension and how it is maintained and regulated, and afterwards in the question of increased tension and some of the theories that have been brought forward to explain its occurrence. Any work I have done on the subject will only be alluded to incidentally.

In order to understand at all how the intra-ocular tension is maintained it is necessary first to study the arrangements for the secretion and elimination of the aqueous humour. The source of the aqueous was for a long time a subject of controversy, but it is now almost universally admitted that this is to be found in the epithelium of the ciliary region. I would attach no special importance to the supposed discovery by Treacher Collins of secreting glands or crypts in the posterior

[1] Paper read before the Edinburgh Medico-Chirurgical Society on February 3rd, 1904.

part of the ciliary region, but would consider that the entire ciliary epithelium is concerned in the secretion. Leber describes the secretion of the aqueous as a transudation or filtration process depending on a difference of pressure between the blood in the vessels and the fluids in the chambers of the eye. Doubtless, however, the epithelial cells play more than a mere passive or mechanical rôle in the process of secretion, or transudation, if that name better describes the process. No nervous mechanism directly influencing the secretory mechanism has been demonstrated. By acting indirectly through the circulation, and especially by disturbing the balance between blood pressure and intra-ocular pressure, the amount and character of the secretion may be greatly modified. The normal aqueous contains only traces of albuminous substances and partakes very much of the nature of normal saline solution. The aqueous, which is rapidly secreted after puncture of the anterior chamber, contains much albumen and fibrin and is spontaneously coagulable.

The vitreous humour is not to be looked upon as merely a homogeneous gelatinous substance. It is really a tissue composed of the finest fibrils, containing in their meshes a fluid almost identical in composition with the aqueous. The vitreous is separated from the aqueous by the lens, and beyond the lens margins by the hyaloid membrane. Although normally fluid can pass readily from the vitreous through the hyaloid, still it has to be borne in mind that there is no fluid secreted directly into the vitreous cavity, and that the interchange of fluid in its meshes is probably very slow.

The chief, or indeed almost the only, path for the elimination of fluid from the eye, at least in man, is now admitted to be the so-called filtration angle. In addition, there is probably some absorption of fluid by the vessels of the iris. A vast amount of experimental work had to be done before these facts were established. Schlemm's canal (see Figs. 1 and 2) has been conclusively shown to be a venous rather than a lymph sinus. It usually appears empty when examined under the microscope, but, if carefully looked for, blood corpuscles will often be detected here and there in its lumen. In a normal eye enucleated for an orbital sarcoma, I found blood cells lying within the canal in many of the sections.

FIG. 1.—Corneo-sclerotic junction in the normal eye.

FIG. 2.—Filtration angle, normal eye. In this section Schlemm's canal is seen subdivided. × 50.

FIG. 3.—The same in an eye with shallow anterior chamber. This eye was hypermetropic to the extent of 4.5 D. This is the type of eye usually considered to be predisposed to attacks of acute glaucoma from blocking of the filtration angle. The veinlets communicating with Schlemm's canal are well seen. × 50.

PLATE II.—TO ILLUSTRATE DR PATERSON'S PAPER.

With regard to the kind of communication supposed to exist between Schlemm's canal and the anterior chamber, I may mention that this subject gave rise to a controversy lasting over a quarter of a century. Schwalbe and his followers maintained the existence of a free communication, while Leber and his followers took an opposite view. The matter has been finally settled by what appears to me to be a sort of compromise between the two opinions. As against Leber's earlier views, it is easy to demonstrate, as Leber himself has since done, that solid particles in very fine division, *e.g.*, Chinese ink, can pass freely from the anterior chamber into Schlemm's canal. On the other hand, the communication must be by the minutest pores, and it is generally considered that the lines of junction between the endothelial cells constitute the only openings.

The anterior ciliary veins have direct communication with Schlemm's canal (see Fig. 3), and so the fluid from the anterior chamber passes directly into the veins of the sclero-corneal margin. Injections have shown that there is also a direct passage of fluid from the anterior chamber into the veins of the ciliary body near the filtration angle. Nuel has recently, by means of ink injections into the anterior part of the vitreous, demonstrated the paths of elimination in the living eye. In man he was able to experiment on eyes requiring removal for malignant disease of the orbit. The ink passed readily forward through the hyaloid into the posterior chamber, then through the pupil into the anterior chamber. From the anterior chamber the ink not only passed out freely by the filtration angle, but also penetrated the anterior surface of the iris, and passed deeply into the iris tissue.

Nuel concludes that, in man, the iris probably plays a part of some importance in the absorption of fluid. In monkeys I found that ink injected into the anterior chamber in the freshly enucleated eye passed very freely into the iris (see Fig. 4).

Many attempts have been made to estimate the rate of secretion of the aqueous during life. To insert a cannula into the anterior chamber and collect the fluid which escapes through it, gives, of course, an entirely erroneous impression of the rate of secretion during life, as the low intra-ocular tension induced by drawing off the aqueous causes fluid to transude from the

vessels at a greatly increased rate. On the other hand, if a cannula introduced into the anterior chamber in the living eye stand in free communication with a column of fluid equal to the intra-ocular tension, no fluid will flow into the eye, but by raising the pressure of fluid above the intra-ocular tension, fluid will be made to flow into the eye through the cannula. Leber has supposed that, by increasing the pressure in this way to about 50 mm. Hg., or twice the normal intra-ocular tension, the ciliary secretion is completely suspended.

In the dead eye the amount of fluid (neutral saline solution) which will pass from the anterior chamber into the veins under different conditions of pressure, etc., can be very exactly estimated. A cannula or hollow needle is introduced into the anterior chamber, and stands in communication with a column of fluid of any desired height. Between the needle and the reservoir of fluid a finely graduated glass tube is introduced. Priestley Smith devised the ingenious method of introducing a small air bubble at the end of the glass tube next the reservoir, so that the fluid, as it passes into the eye, carries the bubble with it, and enables the amount of fluid passing in a given time to be accurately measured.

In the human eye, shortly after death, the flow through the anterior chamber at normal intra-ocular tension is about 5 cmm. per minute. The anterior chamber in man has been estimated to contain about 240 cmm. of fluid, so a rate of elimination of 5 cmm. per minute would provide for a renewal of the aqueous every forty-eight minutes. It is probable, however, that the flow during life is even slower than this. During life the blood pressure in the veins will tend to check the flow from the anterior chamber, while after death there is no obstacle to the free flow of fluid outwards. No evidence of any sort of currents in the aqueous can be detected when fine particles in suspension are introduced into the anterior chamber, and in Hamburger's experiment, where coloured fluid is introduced into the posterior chamber in the rabbit, one finds that the fluid will stay there ten to fifteen minutes without appearing through the pupil. This shows how slow the flow forward must be in this animal.

With regard to the question of outflow by way of the optic nerve Nuel has found that in the rabbit this path is of considerable importance, and my own experiments on this

animal confirm his results. In the fresh monkey's eye, half an hour after death, I also found that Chinese ink, injected into the vitreous at normal intra-ocular pressure, appeared to pass into the lymph spaces round the central vessels. Microscopic examination, however, showed me that only the fluid part of the ink (a deep purple solution) had passed into these perivascular spaces, and that the solid particles had failed to penetrate into the nerve. Priestley Smith has shown that in the sheep's eye hardly a perceptible amount of fluid passes out by way of the nerve, but it has to be borne in mind that in the sheep there are no central vessels surrounded by well-marked perivascular spaces comparable to those seen in man and the monkey. I believe that in man a slow passage of fluid from the vitreous takes place by this route.

As regards the permeability of the hyaloid and zonule of Zinn, I have already indicated that fluid readily filters from the vitreous into the posterior chamber, and that even solid particles in sufficiently fine division can also penetrate the hyaloid. The meshes of the zonule present little or no obstacle to the free passage of fluids.

Intra-ocular Tension

In order that the eyeball may act efficiently as a dioptric apparatus a certain intra-ocular tension is necessary to maintain the contour of the cornea, support the intra-ocular contents, and give a firm point of attachment for the ocular muscles. The fluid contents of the eyeball stand at a pressure intermediate between the arterio-capillary and venous blood pressures. The most careful manometric observations have shown that in health the intra-ocular tension is equal to about 25 mm. Hg., and that physiological variations from this standard are possible only within a very limited range. There is no difference in pressure in the aqueous and in the vitreous chambers. Recently it has been conclusively shown by Hess and Heine that the intra-ocular tension is not appreciably altered by accommodation. There is every reason to suppose that the intra-ocular tension can never exceed the blood pressure in the ciliary arteries, viz., 90 to 110 mm. Hg. In animals this amount of pressure has been found to prevent

completely the flow of blood into the eyeball. The blood pressure in the capillaries of the ciliary region has been estimated at about 50 mm. Hg. The blood pressure in the veinlets into which the fluid filters from the anterior chamber must of course be lower than the intra-ocular tension, and probably amounts to about 10 to 15 mm. Hg.

So intimate is the relationship between blood pressure and intra-ocular tension that in the apparatus which I have described the heart beats often show as minute oscillations of the air bubble on the scale.

In the living eye nothing is easier than to watch with the ophthalmoscope how the slightest pressure with the finger will cause first collapse of the root of the vein and then venous pulsation. By increasing the pressure still further, it is possible to observe arterial pulsation and finally complete emptying of the arteries.

The arterial pulsation so often noticed in cases of glaucoma affords another illustration of the close relationship between blood pressure and intra-ocular tension. The blood in this case is forced into the eye during the systole of the heart while the artery collapses during the period of diastole. The same pulsation has been noted in cases of sudden faintness for the opposite reason, viz., weakening of the heart's action while the intra-ocular tension is normal.

The venous pressure in the blood-vessels leaving the eye cannot be raised to any extent unless by tying the veins just as they leave the eyeball. By this means Leber and Bentzen raised the intra-ocular tension in rabbits to about 70 to 90 mm. Hg. There is no doubt that within certain limits the rise and fall of intra-ocular tension runs parallel with changes in the blood pressure, The result of experiment shows this very clearly. In animals bled to death intra-ocular tension falls very low, *e.g.*, in rabbits to 8 to 12 mm. Hg. A similar fall of pressure may be obtained by division of the spinal cord, which causes enormous distension of the abdominal blood-vessels. Similarly the injection of large quantities of saline solution into the circulation, by raising the blood pressure raises also the intra-ocular tension. Thus Heine, in the rabbit, by raising the blood pressure to 300 mm. Hg., raised the intra-ocular tension at the same time to 100 mm. Hg. Compression of the

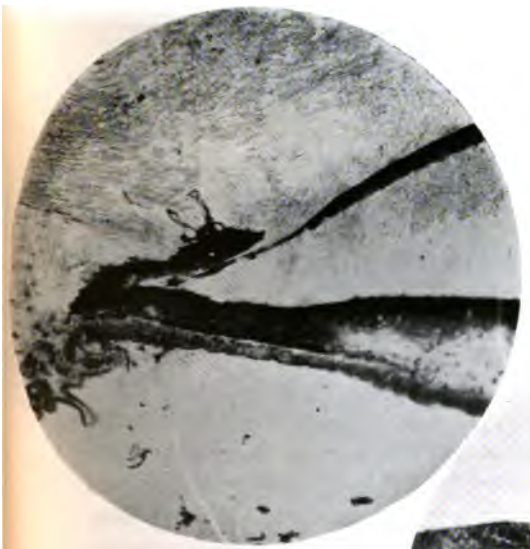

FIG. 4.—Injection of Chinese ink into the anterior chamber in the monkey's eye. The ink passed freely into the iris tissue as well as into Schlemm's canal and the veins. × 50.

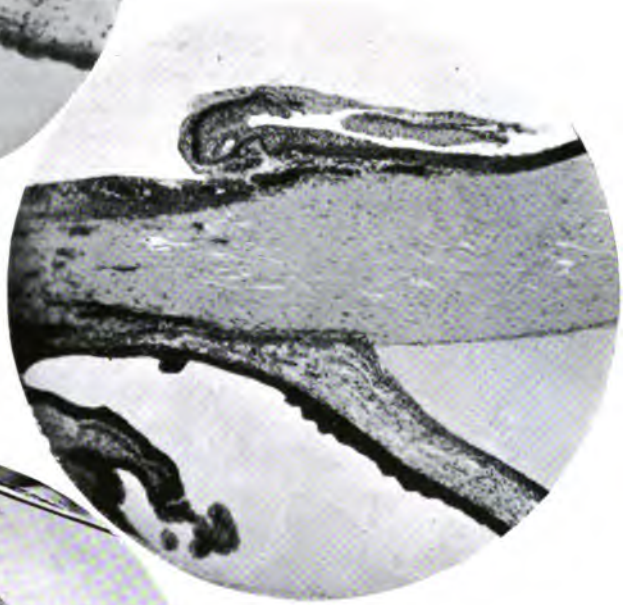

FIG. 5.—Obliteration of the filtration angle by the adhesion of Knies. × 50.

FIG. 6.—Secondary glaucoma with iris bombé from iritic adhesions. Traumatic cataract.

PLATE III.—TO ILLUSTRATE DR PATERSON'S PAPER.

abdominal aorta also greatly raises the intra-ocular tension, and the same is true for other means of affecting the arterial blood pressure. Many drugs which affect the circulation have been shown experimentally to affect secondarily the intra-ocular tension.

Division of the sympathetic appears to cause some diminution of tension with hyperæmia, but the effect is usually not persistent. The influence of mydriatics and myotics on the tension of the normal eye appears to be unimportant.

GLAUCOMA

We define glaucoma as the state of increased intra-ocular tension. We do not propose to discuss the disease from a clinical standpoint, and do not therefore touch the question of the existence of a simple glaucoma without any perceptible rise of tension.

Many attempts have been made to produce glaucoma artificially in animals, but these, for the most part, have been attended with only partial success. A temporary increase of tension may indeed be induced in many ways, as has been already seen in dealing with the question of the relationship of blood pressure to intra-ocular tension. The most successful attempts to induce a condition of artificial permanent glaucoma appear to have been those of Bentzen, working in Leber's laboratory. After many failures he devised the plan of wounding the tissues at the filtration angle by a blunt discission needle introduced into the anterior chamber, and in this way he produced adhesions which shut off the filtration angle, and gave rise to what was apparently a permanent condition of increased tension.

The condition of glaucoma or increased intra-ocular tension falls naturally into two divisions. (*a*) Primary, where the increased tension appears to arise independently of disease or injury. (*b*) Secondary, where the increased tension develops as the result of some pathological condition which has arisen in the eye following disease or injury. Eyes suffering in this way occasionally require enucleation, and I am able to illustrate many of these conditions. In secondary glaucoma an evident mechanical obstruction to the flow of fluid from the eye can usually be demonstrated, and the increased tension depends

upon retention. Thus the complete sealing of the pupillary aperture by the formation of iritic adhesions obstructs the flow of fluid through the pupil, causes the iris to bulge forwards (iris bombé), and raises the intra-ocular tension (see Fig. 6). In other cases the blocking may be due to foreign matter in the aqueous, *e.g.*, fragments of lens matter in traumatic cataract blocking the spaces of Fontana. In cases of serous cyclitis the rise of tension so often observed is probably due to blocking of the filtration angle by inflammatory products, *e.g.*, leucocytes, wandering cells containing pigment, sheds of fibrin, etc. A deposit of pigment in the tissues adjoining Schlemm's canal is very characteristically present in many glaucomatous eyes.

The increased tension observed in intra-ocular tumours is not due primarily to the size of the growth projecting into the vitreous. The stage of increased tension is usually reached when the retina becomes completely detached by an albuminous exudation from the choroid caused by the irritative action of the new growth. This exudation presses the retina forward against the lens and brings about the stage of glaucoma. In some rare cases, of which I show you a fine example, there is a direct mechanical blocking of the filtration angle. Here you will see a ring sarcoma of the ciliary body and iris everywhere blocking the filtration angle. In this case the media remained clear, and the disc could be seen deeply cupped. The tumour being so far forward, the retina was not disturbed. The secondary increased tension so frequently following extensive adhesions of the iris to the cornea, as typically seen in cases of extensive perforating ulcers, is another familiar instance of increased tension arising from obstruction to the outflow of fluid.

Primary Glaucoma

Here the simple mechanical explanations which so satisfactorily explain secondary glaucoma no longer suffice. One great obstacle in the way of investigation is the obvious difficulty of obtaining glaucomatous eyes for examination in the earlier stages of the disease. Eyes enucleated are almost always in the stage of glaucoma absolutum, when the anatomical findings are more or less untrustworthy owing to the presence of added complications. It is only when a patient affected

FIG. 7.—Deep cupping of the optic disc in advanced glaucoma. The retina is well preserved, except the nerve fibre and ganglion cell layers. The nerve is highly atrophic.

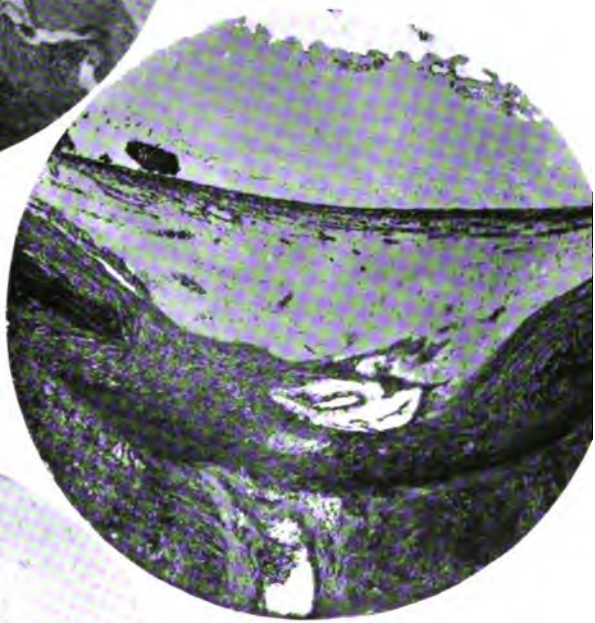

FIG. 8.—Cupping of the disc obscured by organised exudation. (Dr Argyll Robertson's case of hæmorrhagic glaucoma.) × 50

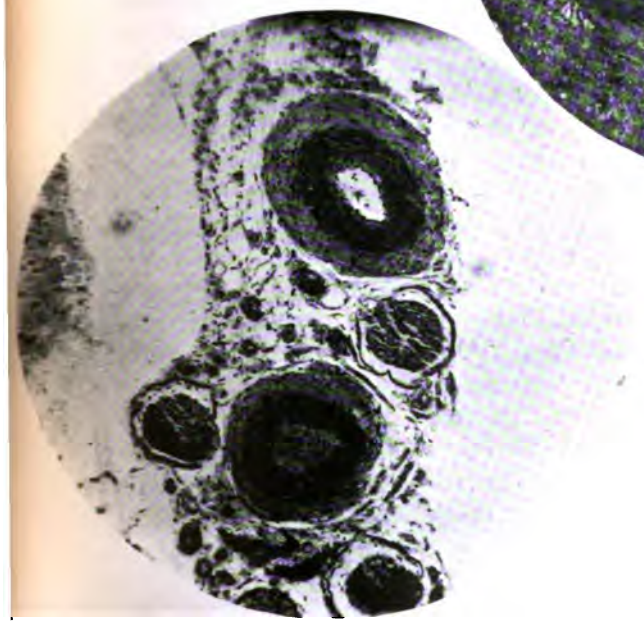

FIG. 9.—Some of the posterior ciliar vessels in the same case, showin thickened walls. × 50.

PLATE IV.—TO ILLUSTRATE DR PATERSON'S PAPER.

with glaucoma in its earlier stage dies of some intercurrent affection that the pathologist has a chance of coming to a conclusion regarding what are the essential and primary lesions in glaucomatous eyes. As a matter of fact very few cases of the kind have been published, and no case appears to me just absolutely the right one for a conclusive determination of these facts. I have not been fortunate enough to examine any specimen of primary glaucoma in the initial stage, and can only show you from more advanced cases what the most typical lesions are in eyes that have suffered for a long time from increased tension. These lesions are :—

1. Cupping of the disc with accompanying optic atrophy (see Figs. 7 and 8).
2. Closure of the filtration angle (Fig. 5).
3. Degenerative changes in the intra-ocular blood-vessels (Fig. 9).

The cupping of the disc plainly could not cause the increased tension, although its presence may largely determine the deterioration of vision. The view that the optic nerve changes observed in glaucoma, *e.g.* neuritis, cupping, atrophy, are primary in character, has never met with much favour. Most of the glaucoma theories therefore stand in close relation to (2) or (3).

The older views of glaucoma associated with the names of Von Graefe and Donders were based on the idea of hypersecretion, over-filling of the eyeball by a too copious secretion of intra-ocular fluid. Von Graefe called in the aid of a serous choroiditis to explain the increased secretion and rise of tension. More recent knowledge, however, has much to say against such a theory. In the first place the choroid does not take any share in the secretion of the intra-ocular fluids, and further, any fluid poured out from the choroid would be more likely, as Panas has pointed out, to cause retinal detachment than anything else. In my opinion the limiting membrane of the retina is very impervious to fluids. Again, changes in the choroid do not seem to be at all constant in glaucoma, at least in its earlier stages.

Donders advocated a hypersecretion theory, and supposed that the hypersecretion depended on some nervous influence. It is difficult, however, to conceive that a disease so persistent in its course could be due to such a cause.

An altogether new conception of glaucoma, based on a retention theory, was in 1876 promulgated by Knies. Knies's theory was briefly this: Glaucoma is evidently due to a retention of fluid in the eye. This retention is caused by the adhesion of the root of the iris to the cornea, this adhesion blocking the outlets by which fluid leaves the eye. The formation of the adhesion Knies ascribed to an inflammation of the tissues at the filtration angle (Fig. 5).

Weber in 1877 took much the same view of glaucoma, but considered that the primary lesion consisted in the root of the iris being pressed against the cornea by the swollen ciliary processes. He also attached importance to a supposed compression of the circulus iridis major in acute glaucoma. There can be no doubt of the great importance of the adhesion of Knies, this lesion being so very frequently met with, and its presence explaining so well the occurrence of increased tension. At the same time this condition no longer ranks in the eyes of most observers as a primary lesion. In certain glaucomatous eyes examined in the early stage it has not been present. We might say then of this condition that, with very few exceptions, it becomes sooner or later established in eyes suffering from marked rise of tension, but as a primary essential lesion in all cases of glaucoma it no longer holds its ground.

Czermak and Birnbacher have laid special stress on disease of the large emissary or vortex veins at their points of exit from the sclera. They described the lesions as endo- and periphlebitis leading to total or partial occlusion of the vessel lumen. This observation has been to some extent confirmed by other writers, but the condition does not appear to be at all constant, and so cannot be held to be the cause of glaucoma. It is also difficult to see how any form of treatment could be of value in glaucoma if it really depended on occlusion of the vortex veins. They also attached great weight to choroidal changes observed in the eyes which they examined microscopically. As, however, the eyes had mostly suffered from marked rise of tension for a long time before enucleation, the primary character of these changes seems very doubtful.

Priestley Smith some years ago brought forward a retention theory which he based chiefly on his observations regarding

the constant growth of the lens during life. He has supposed that in elderly people the circumlental space becomes narrowed, especially in hypermetropic eyes, and that any severe congestion or swelling of the ciliary processes may completely obliterate it and produce a damming up of fluid in the vitreous cavity, with advance of the lens and iris, and obliteration of the filtration angle. Simple and satisfactory as this theory may appear there are many difficulties in the way of accepting it. It is obvious in the first place that the theory is quite incapable of explaining any but the more acute forms of glaucoma. Even as an explanation of acute glaucoma there is much to be said against the theory. In eyes enucleated in the later stages of glaucoma I have never been able to find any evidence that the lens was or ever had been in contact with the ciliary processes. The experience of Panas and others is in conformity with mine on this point. Another objection to Priestley Smith's theory is the fact that puncture of the anterior chamber in glaucoma readily evacuates the excess of fluid from the eyeball. Were Priestley Smith's theory strictly true we would expect to see the section made in operating for acute glaucoma inevitably followed by violent propulsion of the lens forward, rupture of the zonule, and escape of vitreous.

Panas, who has written a valuable monograph on glaucoma, says with truth that while it is easy to demolish it is much less easy to build. He appears to favour a modified hypersecretion theory, the hypersecretion being due to changes in the nerves and blood-vessels. He looks to new discoveries in physiology and pathology to explain his hypothesis. He believes in an increased volume of the vitreous shallowing the anterior chamber; but as increased fluidity of the vitreous is very characteristic of glaucoma, and the hyaloid is very permeable to fluids, it is difficult to see how this increased volume of vitreous can exist as long as the channels of escape from the eye remain open.

Abadie's idea of glaucoma as due to changes in the sympathetic system has not found much favour. Experimental and clinical evidence have alike shown that changes in the sympathetic, even if they exist, could not offer any adequate explanation of glaucoma.

In seeking an explanation of the origin of acute glaucoma I would, like most observers, favour a retention theory. In some eyes the angle of the anterior chamber is very narrow (see Fig. 3), and any increase of thickness of the root of the iris such as might attend venous congestion of the ciliary region or dilatation of the pupil would be sufficient to cause a blockage. The occasional occurrence of acute glaucoma after dilatation of the pupil with atropin is explained by the blocking of the filtration angle by the thickened retracted iris. A vicious circle would be thus established, the blocking of the filtration angle becoming eventually permanent by the formation of the adhesion of Knies. One great point in favour of a retention theory as necessary to explain at least persistent very high tension is the well-known fact that glaucomatous eyes remain hard for a long time after enucleation. I can also corroborate the findings of Leber and Bentzen that there is practically no outflow from such eyes. The extreme shallowness of the anterior chamber in glaucoma, especially in its acuter forms, has always attracted much attention, but has never been satisfactorily explained. Whether the advancement of the lens is present at the very onset of an acute glaucomatous attack, or appears only when the attack is more fully developed, is not quite clear. One may suppose that pressure in the aqueous and vitreous chambers is always equal, and it seems very doubtful whether fluid is ever really pent up behind the lens. In animals' eyes injections of fluid into the vitreous at pressures greatly exceeding the normal tension produce very little shallowing of the anterior chamber. In eyes liable to acute glaucoma a very shallow anterior chamber is the rule. With the blocking of the filtration angle there is probably an advancement of the root of the iris and anterior part of the ciliary body, which further increases the shallowness of the anterior chamber.

In seeking an explanation of the more chronic forms of glaucoma, I would lay most stress on changes in the vascular system both general and local. The former might act by affecting the general blood pressure and the latter by promoting venous stagnation, thrombotic changes, and the like. Supposing, as one does, that Knies's adhesion is not developed in the more chronic cases with very little rise of

tension, still the venous outlets from Schlemm's canal might readily be narrowed or obliterated by disease of the vessel wall. In old glaucomatous eyes, with adhesion of the filtration angle, these venous rootlets are difficult to trace and identify.

The variety of glaucoma which occurs in association with retinal hæmorrhages is perhaps the type of the disease in which signs of vascular degeneration, both local and general, are most marked. From a specimen kindly handed over to me by Dr Argyll Robertson, I am able to show you very typical and severe lesions in a case of this kind. When first seen, the case presented the appearances of a neuro-retinitis with hæmorrhages. Later, very marked glaucomatous symptoms supervened, and were little affected by treatment. The eye, which had become sightless and continued painful, was enucleated about four months after the patient first came under observation. You will recognise in the specimen the complete sealing of the filtration angle by the formation over a wide area of the adhesion of Knies. It may be worth while pointing out that the presence of this adhesion is difficult or impossible to recognise during life. In the case before us, the anterior chamber appeared of normal depth. Any change in the position of the root of the iris is always difficult to detect, the parts being hidden by the grey line of the limbus corneae.

The retina is highly disorganised and much thickened posteriorly. Hæmorrhages are scattered through its substance or lie on its surface under the hyaloid. Some of the hæmorrhages appear quite fresh, others are evidently of older date. Here and there are large irregular spaces filled by a finely reticulated exudation, which in places shows signs of becoming organised. A mass of organised exudation lies over the disc and spreads itself over the retina in a continuous layer for some distance. The central artery and vein appear healthy in their course up the stalk of the nerve, but are greatly constricted just as they appear on the surface of the disc. Whether or not this constriction is due to their involvement in the exudation it is difficult to decide. The smaller retinal vessels appear for the most part healthy, and the marked hyaline degeneration noted by some observers is certainly not present in this case. Whether the first symptoms were due to thrombotic changes is also uncertain. The posterior ciliary arteries

show very great thickening of their middle and outer coats, the retina being practically normal. In the choroid no noteworthy changes were found. The choroid capillaries were carefully examined. The capillaries were full of blood corpuscles but appeared normal. The venous engorgement of the ciliary region was very marked. The emissary veins were not specially located and examined. The iris showed the adhesion of Knies as already mentioned, and was thickened and infiltrated and adherent in places to the anterior lens capsule. The lens was normal in position. At no time during the progress of the case was there evidence of advance of the lens, and yet Knies's adhesion is widely developed.

The vitreous was of a faint straw colour, and contained a considerable number of wandering cells and a few blood corpuscles.

The relationship of glaucoma to hypermetropia has been dwelt upon by Priestley Smith and others. Of course one has to bear in mind the great frequency of hypermetropia in elderly people. Still, it must be admitted that such an eye as that shown on the screen is, from its build, predisposed to a glaucomatous attack if the theory of retention by sudden blocking of the filtration angle offers the true explanation of acute glaucoma (Fig. 3).

In myopia, glaucoma, in its acuter forms, is rare, although at one time the increase in the length of the eyeball in myopia was ascribed by many to increased tension. The secondary glaucoma which is so often troublesome in the after treatment of cases of high myopia treated by extraction of the lens, is sufficient proof that a myopic eye, by reason of stretching or thinning of its coats, does not become exempt from glaucoma when a hindrance to the outflow of lymph is artificially induced.

Glaucoma is characteristically a disease of advanced life, and its relation to changes in the vascular system, although much commented upon, has not received, in my opinion, that full share of attention which it deserves.

In a recent paper (*Beiträge zur Augenheilkunde*, November 1903) Zimmermann discusses the pathogenesis of glaucoma at great length. His view is that glaucoma depends on a reduction of arterial blood-pressure, due to cardiac weakness from

such causes as myocarditis, mitral insufficiency, fatty heart, arterio-sclerosis, etc. The diminished arterial pressure leads to nutritive changes, transudation, etc., and brings about the condition of glaucoma. In my opinion, experimental and clinical evidence are alike opposed to Zimmermann's views. Experimental evidence seems all to show that, within limits, the intra-ocular tension varies with the blood-pressure. If patients suffering from severe cardiac disease frequently developed glaucomatous symptoms, a large general hospital, like the Royal Infirmary, would be sure to furnish plenty of such cases; but no case of the kind has so far come under my notice.

Following up his views, Zimmermann would treat glaucomatous symptoms with strophanthus, and cites cases in which great and lasting benefit followed this treatment. An extended trial will doubtless show whether the treatment with strophanthus has really the value which Zimmermann attaches to it. In my experience the vascular changes so frequently met with in patients suffering from glaucoma have rather suggested an increased than a lower arterial pressure. In Edinburgh, acute glaucoma seems to be a very rare disease; subacute and chronic cases are common. A type very frequently met with is that in which there is slight rise of tension with entire absence of pain, an anterior chamber slightly shallowed, and usually marked distension of the anterior ciliary vessels. A systematic study of the arterial and venous blood-pressures in such cases seems well worth carrying out, and might throw some light on the etiology of the more chronic forms of glaucoma. Dr Oliver's "Hæmodynamometer" appears to me to be the instrument most likely to give reliable records. It does not seem worth while for investigators to study further the changes in glaucomatous eyes, unless an opportunity offers for examination of a case in the earlier stages. Such an opportunity might, we think, be found in animals, as the disease is said to occur frequently in aged dogs kept under highly artificial conditions.

I wish to express my indebtedness to my colleagues at the Infirmary, and especially to Dr Mackay, for providing me with much of the pathological material which I have just demonstrated. To Dr Argyll Robertson my thanks are also due for supplying me with some valuable specimens.

CONTRIBUTIONS TO THE STUDY OF THE ACTION OF SEA-SNAKE VENOMS—PART I.[1]

By Sir THOMAS R. FRASER, M.D., F.R.S.,
Professor of Materia Medica in the University of Edinburgh
and
Major R. H. ELLIOT, I.M.S.,
On Special Duty for Snake Venom Research, under the orders of H.E. The Secretary of State for India
(From the Pharmacology Laboratory of the University of Edinburgh)

(*Abstract*)

THE only important contributions to the literature of the subject with which we are acquainted, are those recently made to the Royal Society by Captain Leonard Rogers, I.M.S.

Whilst acknowledging the value of these papers, we desire to state that our work was planned before we saw them, and has in all respects been independent of them.

The venoms used in this research were those of two species of Sea-snakes :—

1. That of *Enhydrina Valakadien* : (*a*) expressed in Madras by Dr Pinto from the venom glands of freshly killed large snakes and sent to us in the dry state ; and (*b*) extracted by us from the dried glands of small snakes which had been collected by the same gentleman ; and,

2. That of *Enhydris Curtus*, prepared in the same way as the first-mentioned specimen, of which, however, only a small quantity was procured for us by Dr Pinto.

The Minimum Lethal Doses of the Various Specimens of Venom.

1. (*a*) Expressed *Enhydrina Valakadien* venom :—

M.L.D. for rats = 0·00009 gramme per kilo of body weight.
for rabbits = 0·00006 „ „ „ „
for cats = 0·0002 „ „ „ „

The minuteness of these doses proves that sea-snake venom

[1] Read June 9, 1904, before the Royal Society, and published by permission of the Society.

is the most lethal of all substances whose lethal power has been determined.

1. (*b*) *Enhydrina Valakadien* venom extracted by us from dried glands :—

This proved to possess a lethality rather less than half that of the expressed venom.

2. Expressed *Enhydris Curtus* venom :—

M.L.D. for rats—between 0·0005 and 0·0006 gramme per kilo.

The minimum lethal doses for rabbits and cats likewise proved to be higher than those of the Enhydrina venom.

We mention this difference in lethality between Enhydrina and Enhydris venoms without laying stress on it, as we are unable to be certain that it was not due to some change which the Enhydris venom had undergone.

Comparison of the Relative Lethality of Enhydrina and Cobra Venoms for Various Animals.—An active specimen of Cobra venom was taken, the M.L.D.'s of which for rats, rabbits, and cats had been found to be 0·0005, 0·0006, and 0·010 gramme respectively, per kilo. of body weight of animal. Expressing the smallest M.L.D. in the case of each venom as the unit, we find the relative lethality for the different kinds of animals to be the following :—

Cobra venom, rats = 1 ; rabbits = 1·2 ; cats = 20.
Enhydrina venom, rabbits = 1 ; rats = 1·5 ; cats = 3·3.

The difference in the cat-rodent relationship is especially suggestive of a marked difference in the physiological actions of the two venoms, and the reversal of the rat-rabbit relationship is also of some significance, in the same connection.

Symptoms of Sea-snake Poisoning in Animals.—In the main these symptoms resemble those of cobraism, but the dyspnœa is more urgent, probably because the heart is not directly affected by the venom, as it is in cobraism.

We have observed that lid-rise of the lower lid is a constant sign in Enhydrina poisoning, as it is in the course of poisoning by the venom of the Cobra and Krait. It appears to be produced by an elastic rebound of the lid, caused by paralysis of

its depressor muscle, probably central in origin, and it is closely comparable with the ptosis met with in cobraised men and monkeys.

Of the two points dealt with above, the first suggests a difference between the actions of Cobra and Enhydrina venoms, and the second a resemblance between their actions.

The Antagonism of Calmette's Serum and Enhydrina Venom Compared with that between Cobra Venom and the same Serum. —A sample of Calmette's serum which proved to be definitely antagonistic to Cobra venom, exerted only a very feeble action against the venom of *Enhydris Curtus*. The venoms were mixed together and left in contact with the serum *in vitro* for half an hour before injection. We thus have obtained definite evidence of a chemical difference in the composition of the two venoms, from which differences in their actions may confidently be anticipated.

Methods of Experiment Employed.

These were :—

(1) Perfusion of the frog ventricle with solutions of Enhydrina venom.

(2) Perfusion of the vessels of pithed frogs with solutions of Enhydrina venom.

(3) Kymographic experiments, in which the blood pressure, respiratory movements, etc., were recorded and studied, both before and after the intravenous injection of Enhydrina venom.

The movements of the auricle and ventricle were also studied during life by removing a portion of the chest wall, and attaching levers to the heart by hooks and silk threads. Venom was intravenously injected, and the results recorded and noted.

(4) The state of the phrenic, sciatic and vagal nerve-ends was studied immediately on the occurrence of death in animals which had received various lethal doses of Enhydrina and Enhydris venoms. The secondary current was used for this purpose, and the distance of the secondary from the primary coil, when a muscular contraction was observed, was noted and stated in millimetres.

(5) The medulla oblongata of rabbits was exposed and

Enhydrina venom was dropped upon the medulla at the region of the respiratory centre. Respiratory movements were recorded on a drum, with the aid of a double stethograph.

Summary of Results.

(1) Enhydrina venom has no direct action on the walls of the arterioles, or at least has no action in any strength of solution which could be present in the blood of a human victim of Sea-snake bite.

(2) Enhydrina venom acts directly on the isolated frog ventricle, producing a tonic and stimulating effect, but this action is produced only by very strong solutions (1 : 5000). The heart-beat is quickened, and the result is therefore similar to that produced by very weak solutions of Cobra venom (1 : 1,000,000, or weaker).

(3) By experimenting with the mammalian heart exposed *in situ*, we have clearly shown that Enhydrina venom has no direct action on the vagal cardio-inhibitory centre. This affords a striking contrast to the condition observed in Cobra poisoning. In the latter case, the powerful tonic and stimulant action of the venom on the heart-muscle (or more probably on its nerve-ends) is masked by equally powerful and direct stimulation of the cardio-inhibitory centre. In Enhydrina poisoning, on the other hand, the complete absence of cardio-inhibition leaves the feeble tonic action on the heart free to manifest itself, as appears to be displayed in several of our tracings. We cannot otherwise explain the increase in rate of the heart-beats which we have not infrequently met with in our experiments.

(4) Enhydrina venom has apparently no direct action on the vaso-motor centre. Rogers found that on the injection of a Viperine venom, or of the venom of the Banded Krait (*Bungarus fasciatus*), into an animal, a marked fall of blood pressure occurred, which was of central origin. In an investigation made by one of us with Drs Sillar and Carmichael (of the Materia Medica Laboratory, Edinburgh), it was found that a similar and powerful action is exerted by the venom of the common Krait (*B. cæruleus*). The absence of any such action by the venom of Enhydrina is therefore worthy of note.

(5) The blood-pressure curve in Enhydrina poisoning is a

remarkably steady one, provided that moderate doses of venom are given and that care is taken to avoid the injection of large volumes of fluid into the blood-vessels. This is due to the fact that the blood pressure is exposed neither to the influence of the rival forces which act on the heart so strongly in cobraism, nor to the direct vasomotor changes with which we have dealt in the preceding paragraph.

(6) The respiratory mechanism is that which is chiefly affected by Enhydrina venom. If large lethal doses are employed, such as Rogers appears to have confined himself to, respiration falls rapidly, and a considerable rise of blood-pressure, asphyxial in origin, may precede death. The heart-beat then quickly slows, and blood pressure falls with corresponding rapidity.

Obviously, these are simply the phenomena of rapid asphyxiation. If, however, smaller doses of venom are employed, no marked rise in blood pressure occurs. The ordinary level is maintained until near the occurrence of death; the beat then slows, and the blood pressure falls. Here we have an expression of gradual cardiac failure, brought about by slowly progressive asphyxiation. The absence in slow Enhydrina poisoning of the large asphyxial rises of pressure, which are so characteristic of the final stages of Cobra poisoning, is readily explained by the fact that Enhydrina venom has no direct constrictive action on the walls of the arterioles, such as Cobra venom possesses.

(7) As to the part of the respiratory mechanism that is affected by Sea-snake venom, the rapidity with which respiration is affected, both when venom is injected into a vein, and also when it is applied directly to the medulla oblongata, leaves no room to doubt that the respiratory centre is directly acted on by the venom. On the other hand, we have shown that some degree of motor nerve-end paresis is constantly present in animals dying from the effects of subcutaneous injections of this venom. We have also emphasised the fact that, in experiments carried out by dropping venom on the exposed medulla oblongata, we have failed to kill animals through the respiratory centre with their motor nerve-ends still undamaged. In this respect we have shown that Enhydrina venom differs in its action from Cobra venom. It would therefore appear that, in poisoning with Enhydrina

venom, motor nerve-end paresis plays a much greater part than it does in cobraism. It is not difficult to suppose that a blunting of the motor nerve-end mechanism, even though far from absolute, may seriously add to the embarrassment of a centre which has already been directly and gravely enfeebled. We hope to return to this and other points in a future communication.

In conclusion, we desire to express our sense of indebtedness to the India Office, to the Government of India, and last, but by no means least, to the Madras Government, for the assistance and facilities which they have given us in the carrying out of this research.

ON THE ACTION OF THE VENOM OF "BUNGARUS CŒRULEUS" (THE COMMON KRAIT)[1]

By Major R. H. ELLIOT, I.M.S.,
On Special Duty for Snake Venom Research, under the orders of the Secretary of State for India
W. C. SILLAR, M.B., B.Sc.,
Lecturer on Experimental Pharmacology; Senior Assistant in the Materia Medica Department, University of Edinburgh
and
GEORGE S. CARMICHAEL, M.B., Ch.B.,
Assistant in the Materia Medica Department, University of Edinburgh
Communicated by Sir THOMAS R. FRASER, M.D., F.R.S.
(From the Pharmacology Laboratory of the University of Edinburgh)

(*Abstract*)

THE only previously recorded work known to us on this subject was performed by Captain L. Rogers, I.M.S., and his results were published at the beginning of the present year.

Experiments were performed by us in the Pharmacological Laboratory of the University of Edinburgh with the following results :—

1. We determined the minimum lethal dose of the dried venom for frogs and small mammals, rats and rabbits only being chosen, as our stock of the venom was very limited. We found that the M.L.D. for the frog was about 0.0005 of a

[1] Received May 12. Read June 9, 1904, before the Royal Society, and published by permission.

gramme per kilo., for the rat 0.001 gramme per kilo., and for the rabbit the remarkably low dose of 0.00008 gramme per kilo.

2. We found that Calmette's anti-venomous serum in quantities sufficient to protect rats against ten minimum lethal doses of Cobra venom, in the same quantities was quite powerless to protect these animals from similar doses of Krait venom.

3. We studied the condition of various nerve terminals, both in animals that die after poisoning by Krait venom and in nerve muscle preparations from the frog, and found that the integrity of these nerve ends was invariably involved at a comparatively early stage in the poison.

4. The blood was carefully examined and no evidence of ante-mortem clotting or intravascular hæmolysis was discovered.

5. We examined the action of Krait venom when its solution was perfused through the isolated vessels and heart, respectively, of the frog. We found that this venom, while resembling in action that of Cobra venom, differs greatly in the degree of constriction of vessels and enhancement of ventricular contraction produced. Cobra venom exercises an action in these directions many times greater than that of Krait venom. Cardio-plethysmographic tracings are shown.

6. Studying the manner in which the vital functions of mammals (rabbits, cats, and dogs) were influenced when exposed to the action of this venom, we show by means of kymographic and plethysmographic tracings that the vaso-motor centre is strongly affected; a suspension of the activity of this centre, as shown by the great splanchnic dilatation, rapidly ensuing after its transient stimulation. There are also indications of a feeble cardio-inhibitory action. The experiments and illustrative tracings likewise show that death is brought about by destroying the activity of the respiratory centre.

7. From these results the conclusion may be arrived at that while the symptoms produced by Krait poisoning are similar to those of Cobra poisoning, they differ so much in relative degree as to render it doubtful if they can properly be spoken of as identical.

Clinical Records

THE TREATMENT OF NÆVUS BY X-RAYS

By JOHN R. LEVACK, M.B., etc.,
Medical Electrician, Aberdeen Royal Infirmary

THE various methods hitherto employed in the treatment of nævus have not always been followed by results satisfactory from a cosmetic point of view. The scar produced is often prominent and unsightly, and the patient, morbidly sensitive about appearances after years of scrutiny by his ill-bred and curious fellow-creatures, often leaves the surgeon's hands dissatisfied and disappointed.

The discovery of the action of X-rays on the skin—producing, as they do, dermatitis and even burns which can be classified (Morton, *Brit. Med. Journ.*, April 23rd, 1904), like ordinary burns, into four degrees, according to intensity—naturally led to their effect being tried on telangiectatic stains and tumours.

Few cases have so far been recorded, the best known one being that reported by Jutassy (*Archives of Röntgen Ray*, 1901), where the patient, a male aged 22, had a congenital telangiectasia of the whole right half of the face, with several small tumour masses (angioma) scattered over it.

Prolonged exposure to the rays produced severe reaction, and the raw surface healed slowly. Eighteen months afterwards the telangiectasia had entirely disappeared, and only rose red spots showed here and there where the angiomatous masses had been.

The following three cases treated by me may be of interest.

CASE I. M. S., a girl aged 8 years, with a large nævus occupying the whole left side of the face from the temple to the middle line of the nose and upper lip, was sent to me by Dr Scott Riddell, who suggested treatment of the case by X-rays.

The nævus was of the flammeus variety, and of a deep purplish red colour.

The patch involving the temple, about 1½ inches in diameter, was first treated, the rest of the face being protected by lead foil.

The coil was one of 10-inch spark, the primary current was obtained from six accumulators, and the interrupter was the ordinary hammer break, and the tube was a soft one. Daily sittings of ten minutes were given, but no reaction was obtained at the end of three weeks. I then used the current from the mains (220 volts) through a resistance, giving about 100 volts and from 6 to 7 amperes, and the interrupter now employed was a large electrolytic one. Daily sittings were continued, each lasting three minutes, the anode being generally red hot about half that time.

After a fortnight of this treatment, the part became swollen, dusky-red, and the cuticle rapidly separated into numerous vesicles, which burst, leaving a raw, angry-looking surface. A simple dressing was prescribed, and the patient went home.

The patient's father, a medical man, reported that the skin rapidly peeled off, leaving a raw bleeding surface which discharged freely, and healed very slowly. There was little pain or discomfort beyond that due to the dressing and the profuse discharge.

The patient returned three months later, when I found that the part was completely healed and entirely free from nævus stain. The surface was covered by soft skin scarcely to be distinguished in colour and texture from the healthy skin in the neighbourhood.

The result was considered so satisfactory that it was decided to treat the rest of the nævus in a similar manner, using the current from the main in the manner described above. Daily sittings were given as before, the cheek being now exposed to the rays. In five weeks a good reaction was obtained, and the patient returned home. Healing was again very tedious, and the raw surface discharged freely for weeks.

Two months later, the new skin covering the cheek was quite as satisfactory in appearance as that obtained on the temple, and the telangiectasis had disappeared.

The remaining part of the nævus, involving the left eyelids, left half of the nose and upper lip, was now treated in the same way, with an equally good result.

I saw the patient last week (June 11th), eight months after the last sitting was given. The nævus has practically disappeared, the skin over the affected area being slightly paler in parts than the surrounding healthy skin, and marked here and there by a few small brown pigmented spots. Looked at from a few yards distance, little difference can be detected in the appearance of the two sides of the face, the unsightly purplish red stain has entirely gone, and as the patient puts it, "people don't now look at her."

The reason for treating this case in three sections was that we wished to avoid too large a surface under reaction at one time, but in future I would, in similar cases, expose the whole area at once so as to get an absolutely uniform result. In the above case, the part first treated (the temple) shows as a slightly lighter coloured area than the cheek and nose.

CASE II. Mrs M., aged 38 years, had a nævus on the left half of the upper lip, and extending in isolated small spots upwards along the naso-labial fold and on to the lower eyelid. The patch on the upper lip showed slight swelling and extended deeply into the true skin. It had been treated some years before by scarification and caustics with only slight benefit, some scar tissue being visible here and there in the mass.

Daily exposures to X-rays were given in the manner described above, and at the end of six weeks a good reaction was obtained.

A month later, healing was complete, and the prominent livid patch on the lip was greatly diminished. The new skin was still red and rather tender and apparently the deepest part of the nævus was to some extent still present. I was afraid that a reaction sufficiently intense to destroy the deep dilated vessels might result in a scar that would ultimately shrink and distort the lip.

I now used a fine-pointed electro-cautery to destroy the outlying islands of nævus along the side of the nose and which had not been exposed to the rays. These healed up rapidly with a satisfactory result.

Three months later, the patient returned and expressed herself as satisfied with the final result. The part treated by the rays was still faintly pink, and traces of deep telangiectasis could still be detected on close inspection. I saw the patient yesterday (June 16th), six months after treatment was stopped, and found that the new skin covering the part exposed to the rays looked practically normal—soft and pliable and of a natural colour—while the cauterised parts were marked by minute scars invisible a few feet away. When the patient is flushed, the old red colour returns to some extent, but under ordinary conditions nothing abnormal can be detected except on close inspection.

CASE III. Mrs A., aged 54 years, sent to me by Dr Wallace Milne, had a nævus, circular in shape and 1½ in. in diameter, occupying the left malar prominence and forming an unsightly dusky red mass there, markedly raised above the

normal level of the skin. She had another patch with numerous dilated veins on its surface on the right ala nasi, and one about the size of a shilling and slightly raised above the skin on the back of the left wrist.

Daily exposures to the rays were given as in the other cases, the parts treated being the cheek and wrist. Severe reaction was produced at the end of five weeks. The patch on the wrist healed in a month, and that on the cheek in two months. The nævus tissue in both patches had completely disappeared. The new skin on the cheek was still red and tender, but was rapidly resuming its normal tint. The wrist nævus was replaced by perfectly normal skin.

The patient was greatly pleased with the result and arranged to begin treatment of the remaining nævus on the nose. She had, however, to leave town, and the treatment was meantime postponed.

Remarks.

My experience of these three cases leads me to believe that the treatment of nævus by X-rays is, although tedious, on the whole satisfactory, and is a distinct improvement on the older methods, such as scarification, caustics, actual cautery, etc.

The scar produced differs little from normal skin, being generally of the same colour, and quite as soft and pliant as its surroundings.

The deeper nævi and those forming tumours are naturally more difficult and tedious to eradicate than the superficial ones, but with care and persistence, even they can be made to ultimately yield, and in most instances disappear.

HERNIA INTO THE SUPERIOR DUODENAL FOSSA: OPERATION: NECROPSY

By J. W. DOWDEN, F.R.C.S.,
Assistant Surgeon, Royal Infirmary

HERNIA in this region is sufficiently uncommon as to warrant the recording of this case, which is as follows:—

G. H., aged 13, admitted to the Royal Infirmary, March 24th, 1904.

Complaint.—Abdominal pain and vomiting.

History.—He has been troubled by cramp-like pains in the abdomen ever since he was a few years old; pains which had no relation to meals or the state of the bowels. Six weeks ago he had a more severe attack than usual, which lasted several days and then disappeared, leaving him apparently well. There was no vomiting or constipation. He continued well till a fortnight before admission, when there was a recurrence of the severe symptoms, and three days before entering hospital vomiting was associated with the condition; the vomited matter was at first bilious, but latterly had become darker in colour and foul smelling. The bowels acted two days before admission, but since then there has been no passage even of flatus, in spite of the administration of enemata, castor oil, etc. He has had some difficulty in micturition.

Family and Personal History.—Nothing to note and nothing to point to tubercular disease.

State on Admission.—A delicate, tubercular-looking boy, with long dark lashes, with flushed cheeks, dry lips, somewhat cyanotic. Pulse 120 per minute, weak. Temperature 98° F. There is very intense pain, spasmodic in character, causing him to cry out; the pain is referred to the region of the umbilicus.

Vomiting is fairly frequent, and the vomited matter is thin, brown, and in odour stercoraceous.

On inspection of the abdomen there is a rounded, somewhat pear-shaped swelling about the size of a large fist, which lies in the left hypochondriac and umbilical areas, the narrow part being just above the umbilicus; the broader portion extends up and to the left margin of the ribs. The flanks are not distended, and there is no marked rigidity on respiration.

On palpation, pain is complained of over the swelling, which is so severe that it was not persevered with.

There was no movement of the swelling on respiration.

On percussion, there is all over the abdomen a tympanitic note. Rectal examination reveals nothing. The other systems show on investigation nothing abnormal.

Diagnosis.—Probable old tubercular peritonitis with a band, causing obstruction high up in the intestine.

Operation.—This was performed at once. An incision was made to the left of and above the umbilicus in order to expose the narrow part of the swelling. On opening the abdomen, what appeared to be highly distended and congested bowel immediately presented, lying in marked contrast and adherent to it were absolutely collapsed folds of small intestine. There were some scattered tubercular nodules over the intestine and peritoneum, and the mesenteric glands could be felt enlarged.

The omentum, transverse colon and stomach were displaced upwards. The cæcum was empty, and tracing the collapsed ileum upwards, a portion of constricted bowel was apparently freed, as there was a gurgle, and previously collapsed intestine became filled. It was possible now to pull on coil after coil of congested and dilated ileum, and while doing so the pyriform swelling decreased in size and a finger could be introduced into a sac, through a rounded opening about one and a half inches in diameter. The orifice of this sac looked downwards and a little to the left, which could be seen when the sac was displaced upwards and to the right. After several coils of congested and dilated small intestine were drawn from the sac, there was found to be running through the sac the upper portion of the jejunum and the terminal portion of the duodenum. There were many dilated vessels in the sac, which was then obviously the superior duodenal fossa, and as the general condition was very bad, a few stitches were inserted into the sac wall after the method of gastroplication, and the external wound sutured. Death took place about eight hours after operation.

Necropsy.—Tubercular peritonitis was present. The transverse colon, omentum and stomach were pushed up, while the transverse mesocolon was spread over the upper part of the sac and the mesentery was raised up by the lower portion of the sac.

The sac itself was somewhat heart-shaped, with the apex anterior and to the left, and measured from the spinal column some 4½ inches; it was 4½ inches wide at its base, both in the antero-posterior and transverse diameters.

The apex when raised upwards and to the right showed the orifice of the sac somewhat crescentic, about 1½ inches in its diameters, and looking chiefly downwards and a little to the left. The jejunum issued from the orifice of the sac.

When the sac was everted, tubercular infection was more obvious than elsewhere.

Notes on the Case.—The history and age led to the diagnosis of old tubercular peritonitis with a probable band which had caused obstruction from time to time and ultimately produced an irreducible strangulation. The absence of general distension and the central character of it favoured obstruction high up. It was not till the abdomen was opened and the coils of bowel released from the sac that the diagnosis of duodenal hernia was arrived at.

The difficulty after withdrawing the ileum from the sac was, what should be done with the sac: if cut away, the time required in ligaturing the numerous distended vessels which ramified

FIG. 1.

A, The liver. B, Stomach, with C, transverse colon and omentum displaced upwards. D, the distended hernial sac. E, Collapsed small intestine.

FIG. 2.—Sac pulled upwards.

A, Sac. B, Duodeno-jejunal juncture emerging from crescentic orifice of the sac. C, Transverse meso-colon spreading over sac. D, Mesentery passing to collapsed ileum E. F, Transverse colon.

PLATE V.—TO ILLUSTRATE MR DOWDEN'S CASE.

over its surface would obviate any chance the boy had of recovery, so collapsed and ill was he before operation; in addition there was the possibility of cutting across the superior mesenteric artery, which Moynihan describes exists in the mouth of the sac of right duodenal hernia, and this appeared to be one of that variety, though flexed to the left.

The hernia, on post-mortem examination, appeared to be one into the superior duodenal fossa. I am much indebted to Dr Stuart Macdonald for the trouble he has taken to preserve the specimen for me, and to Mr Grieve for the excellent photographs which he has taken.

Meetings of Societies

Edinburgh Medico-Chirurgical Society

THE tenth meeting of the session was held on Wednesday, 1st June 1904—Professor John Chiene, C.B., President, in the chair.

Dr Norman Walker exhibited: (1) three cases of lupus, complicated by the development of carcinoma after treatment with Röntgen rays; (2) case of psoriasis much improved by Röntgen ray treatment.

Mr George Chiene exhibited: (1) A man, aged twenty-four, operated on four and a half months previously for rupture of the middle meningeal artery and laceration of the temporo-sphenoidal lobe. The operation was performed five days after the injury. The hæmorrhage was entirely subdural, and the oozing from the temporo-sphenoidal lobe was controlled by adrenalin chloride solution (1-5000). (2) An infant, aged six weeks, after operation for acute intussusception. The difficulty in the reduction of the intussusception had been overcome by continuous pressure for some minutes, the bowel having been covered with large gauze swabs. (3) A child operated on for acute intussusception when a year and nine months old. Mr Chiene had previously operated on the patient for a similar condition when the child was four and a half months old.

Dr Allan Jamieson exhibited: (1) A case of keloid of the breast treated by X-rays. Under this treatment the keloid had almost quite disappeared. (2) A case of nævus pilosus.

Dr John Stevens showed a man, aged thirty-two years, suffering from infantile paralysis. The muscles of the shoulder girdle were completely, the triceps, biceps and other muscles extensively, atrophied.

Dr Edwin Bramwell showed a case of Klumpke's paralysis. The patient had fallen a distance of twenty feet, striking the right side of his head and right shoulder. After the fall the right arm was almost powerless. At the present time the man has paralysis, wasting and loss of faradic excitability in all the small muscles of the hand, and great weakness of the flexors of the fingers. The motor power of the other muscles has almost completely recovered. A strip of very pronounced anæsthesia to all forms of stimuli extends along the inner side of the right upper and forearm, both on its anterior and posterior aspects. The whole of the little and the ulnar surface of the ring-finger are anæsthetic. There are no signs of involvement of the sympathetic. The symptoms pointed to a lesion of the eighth cervical and first dorsal roots. The completeness of the paralysis and the long duration of the symptoms (ten months) indicated that the nerve roots or the trunk formed by their union had been severely stretched or torn across.

Mr Cotterill exhibited a patient showing the result of successful operation for lipoma nasi.

Dr Gibson exhibited a case of so-called hypertrophic pulmonary osteo-arthropathy. There were no acromegalic features about the head or face. The phalanges and metacarpal bones were considerably enlarged, and there were trophic changes in the fingers, conforming to the distribution of the nerves to the back of the hand. The feet were also affected in this patient, whose sole respiratory disorder was slight emphysema. Skiagrams of the extremities were shown.

The following card specimens were shown:—

By Mr Scot Skirving: A prostate successfully removed by Freyer's method in a patient aged eighty-six years.

By Mr Cotterill: (1) Amputation at the shoulder joint for spontaneous fracture of the humerus, due to a tumour; (2) tuberculous testis from a child aged two, with microscopic section.

By Dr Gibson: Eggs of Bilharzia hæmatobium from urine.

Dr David Waterston read a paper dealing with some points in the anatomy of the pelvic fascia and perineum in the male in relation to the surgery of that region. The paper was illustrated by a lantern demonstration of photographs from formalin preparations. The difference of opinion among surgeons regarding the best method of removing the prostate gland had led to further examination of the perineal region both by section and by dissection. Dr Waterston demonstrated the relationship of the levator ani to the prostate and the anal canal, and drew attention to the Rhabdosphincter or Prerectalis muscle as an important landmark in operations on the prostate by the

perineal route. The superficial layer of the triangular ligament is attached around the margin of the bulb. The sheath of the prostate is derived from the vesical pelvic fascia; beneath the sheath is the plexus of prostatic veins, within which is the "capsule," consisting of muscular and fibrous tissue, and being really part of the gland itself. The prostate could be shelled out from the sheath, or in such a way as to leave the capsule, and the urethra could be left intact with a little prostatic tissue around it.

Mr Alexis Thomson, reading a paper on the anatomy of the enlarged prostate so far as it bears on the operation of prostatectomy, said that prostatic enlargement was due to a diffuse hyperplasia, chiefly of the glandular tissue, involving the entire organ, though unequally distributed. He had never been able to demonstrate the presence of encapsulated tumours. The general stroma of the gland is rarified, whereas at the periphery of the gland it is condensed, forming a capsule which is least evident on the vesical aspect of the prostate. On other aspects, the capsule is laminated. In the normal and the cancerous prostate the capsule was intimately adherent to the stroma, and only by cutting could they be separated. In the ordinary enlarged prostate one can readily separate the capsule from the stroma by the finger. After digital enucleation of the enlarged prostate, a film of prostatic tissue of variable thickness is left behind, and its glandular epithelium participates in the reformation of the prostatic urethra when this has been removed with the prostate. The paper was illustrated by a lantern demonstration.

The President, referring to the confusion of the terms "sheath" and "capsule" in relation to the prostate, suggested that the envelope of pelvic fascia should be termed the sheath, the fibro-muscular coat being called the capsule.

Professor Cunningham concurred in this suggestion, though anatomists have hitherto called the pelvic fascial covering the capsule. The muscular envelope has very little sphincteric action, but by its contraction it ejects the prostatic secretion.

Mr Nicoll said it was important to recollect that there are two main varieties of enlarged prostate. First, those prostates in which the glandular element predominates. These are easily enucleated; and secondly, those which are firm and tough and histologically like the normal prostate. In the second variety, the knife is often required for enucleation.

Mr Stiles drew attention to the information to be obtained by treating the excised gland with nitric acid. The small, hard prostate, in which there is an enlarged middle lobe obstructing micturition, was the most difficult to excise.

Mr Wallace said that transverse sections would be useful in showing the relationship of the urethra to the prostate. The perineal route was preferable in the operation of prostatectomy. The enucleation of the adenomatous prostate was easy. One sometimes met with fibro-adenomata of the prostate within the gland.

Edinburgh Obstetrical Society

THE seventh ordinary meeting of this Society was held in Dowell's Rooms on the 8th June—Dr N. T. Brewis, President, in the chair.

An interesting collection of exhibits were shown, amongst those being two vesical calculi, the nuclei of which were formed by hair from a perforating dermoid tumour of the left ovary, and a microscopic section from a case of epithelioma of the clitoris, both shown by Professor Kynoch. Dr J. W. Ballantyne demonstrated his "Obstetric Satchel" which was fully described in the *Journal* for June.

Sir Halliday Croom contributed a paper on "Cæsarean Section in Eclampsia." It had been remarked by many, he said, that we could now deal with any complication which might occur in obstetrics with almost assured safety and success with the one solitary exception of eclampsia. The subject of Cæsarean section for eclampsia had come before the profession, at all events in Germany, to a very considerable extent within recent years. So far as Sir Halliday Croom knew, Van den Akker in 1875 was the first to carry out Cæsarean section in eclampsia along with contraction of the pelvis with a distinctly happy issue. The author then described two cases of his own.

1. Mrs B., aged 20, admitted to hospital on 21st October: slight headache was present on the previous day. At 5 A.M. on the 21st October, she commenced to vomit, and later, as convulsive seizures appeared, medical aid was sought. Frequent recurrence of the convulsions had taken place previous to her admission, and when first seen her face was cyanosed, but there was no apparent œdema of eyelids, hands or feet, and she remained comatose throughout. The abdominal tumour did not appear to be more than usually tense or prominent. Croton oil, pilocarpin and the hot air bath were administered and copious perspiration was induced. Chloroform was administered, but this did not entirely prevent the seizures. At 10 P.M. the temperature was 101° and pulse 130. The urine when drawn off was found to contain about two-thirds its bulk of albumen.

The vagina was very narrow; the fœtal head was high in the pelvis for a primipara; the os uteri was small, only admitting the tip of a finger with difficulty; the cervix was thick and tense, having little of the soft character of a parous cervix; it was hypertrophic and absolutely undilatable either by fingers or instruments. The convulsions continued to recur at intervals of less than five minutes. A further most persevering attempt was made to dilate the cervix, but proved absolutely futile. Immediate delivery offered the only chance of life to both mother and fœtus, and Cæsarean section seemed the only feasible method of procuring this. The operation was performed in the ordinary way, and as the placenta lay on the anterior wall, the incision went right through it. The hæmorrhage was copious, but as the patient was very plethoric, this was an advantage. During the operation, the convulsions had ceased; the cyanosis was less marked and the patient's general condition had improved. Six hours after the operation, the death of the patient occurred, following a severe eclamptic seizure. No post-mortem examination was allowed, but the wound was re-opened and the kidneys extracted. These showed, on examination, extreme cloudy swelling and early catarrhal nephritis.

2. Mrs C., a primipara of 46 years of age, shortly before labour set in at full term, had an eclamptic seizure. When labour began the fits became worse and the intervals shorter and the coma very profound. When Sir Halliday Croom first saw her she had been unconscious for ten hours. On examination, the os uteri could only be made out with difficulty. The cervix was enormously thickened and hypertrophied and projected but slightly into the vagina. The fœtus was far above the brim, and the pelvis itself was generally and uniformly contracted in the first degree. The os uteri would only admit a sound. The patient was absolutely unconscious, with a pulse of 140 and a temperature of 102° F. There was no hope of dilating the cervix within any reasonable length of time, and it was a duty to save a living child. The question was either that of Duhrssen's incisions or Cæsarean section. The latter operation was performed and a living child extracted, which still survives. The patient regained consciousness and remained quite clear for two days. Death supervened on the third day, however, and was due to a low form of pneumonia, whether or not of septic origin could not be determined.

As to the question of whether Cæsarean section was justifiable in these two cases the following points were noted:—(1) The high pulse and continued deep coma, the severity and frequency of the attacks rendering the mother's condition one of great peril. (2) The intense rigidity and hypertrophy of the

cervix in one case, and its absolute closure in the other, rendered any operation *per vias naturales* for saving the child an impossibility. The preservation of the child's life in the second case was of great importance and the mother's condition was practically hopeless. In addition, in the second case the woman was a primipara of 46 who had been ten hours in labour and whose pelvis was slightly undersized.

As regards the literature of the subject; in May 1897 Kettlitz gave a survey of the history of Cæsarean section up to the end of 1896, and found in all twenty-eight cases. In 1903, Streckeisen made a further calculation of cases, and added twenty-six cases more. The latter found that in his twenty-six cases there was a maternal mortality of 32 per cent. Kettlitz stated this to be 50 per cent. This is a considerably higher mortality than in the case of simple eclampsia, which varies from 25 per cent. down to Winckel's very low estimate of 8 per cent., or Veit's still lower figure of 3 per cent. Of course it must be remembered that only the very worst cases were treated by Cæsarean section.

As regards the infantile mortality in eclampsia alone, the figure varies from 44 to 54 per cent. Cæsarean section does not therefore offer any improvement in the mortality of children born of eclamptic mothers, but again it had to be kept in mind that this operation was a last resource.

There were a few facts which undoubtedly predisposed to the production of eclampsia without going the length of theorising; these were: (1) acute and chronic disease of the kidney, (2) a neurotic temperament, (3) old and young primiparæ, and (4) multiple pregnancy.

Sir Halliday Croom then briefly indicated the various views which were held at the present time as regards the pathology of eclampsia. It was a fact beyond dispute that eclampsia was much more prevalent in autumn and spring.

So long as the pathology of eclampsia was not cleared up, so long as there was no common ground on which to build theories, it was obviously impossible to recommend any uniform treatment of eclampsia. Every different class, every different form of treatment, had met with satisfactory results. The question really was, did the fits cease after rapid delivery? In the author's second case they did, and the patient recovered consciousness. Of Streckeisen's twenty-eight cases, in fourteen the fits absolutely stopped, in three they were diminished, in two they remained unchanged, in six no particulars were given, and in two the Cæsarean section was post-mortem. Therefore in about half the cases the fits ceased. Duhrssen and others had also shown that eclampsia more frequently ceased after artificial

than after spontaneous evacuation of the uterus. The supreme principle therefore was to deliver the woman as soon and as carefully as possible. There were four methods of rapid delivery: (*a*) Duhrssen's cervical incisions; (*b*) the use of the Bossi or Fommer dilator; (*c*) vaginal Cæsarean section; (*d*) Cæsarean section proper. Each of these was discussed, and it was shown that the only practicable means in the two cases related was that of Cæsarean section proper. As now performed the operation was practically free of all danger: septic infection was almost impossible, and the only drawback was the ultimate weakening of the abdominal wall. The author did not wish it to be supposed that he advocated this operation for eclampsia generally, but he thought that it offered a distinct means of rapid delivery in certain cases, and it certainly gave the best chance of securing a living child.

The President, Dr Berry Hart, Professor Jardine (Glasgow), Drs J. Ritchie, J. W. Ballantyne, Haig Ferguson, Lackie and Webster took part in the discussion. Dr H. O. Nicholson advocated the pushing of morphia in severe cases as a precise means of establishing the flow of urine. A large dose did not diminish secretion, and in eclampsia it dilated the blood-vessels. Thyroid extract was employed in eclampsia to relax the vessels and was not given to increase metabolism, but to get the kidneys to act.

Dr Berry Hart read a "Note on Tubal Abortion." After pointing out that tubal abortion was one of the most frequent disturbances occurring in tubal gestations, he narrated two cases where he had operated for this condition. In the first the collapsed chorion was found in the pelvis and also a clot in size and shape like a billiard ball, evidently expelled from the tube. In the second case the patient had lost a large amount of blood, and in the pavilion of the right tube lay the gestation the size of an egg adherent all round with about one-half projecting free into the peritoneal cavity. Blood had also dissected its way extra-peritoneally towards the rectum and had ruptured there into the peritoneal cavity. The tube was removed and the pelvis tamponed with iodoform gauze, which was also passed into the vagina. The patient, however, sank on the third day from anæmia and cardiac failure.

Dr Hart considered that in the production of tubal abortion there was first extravasation of blood between the gestation sac and its tubal attachment due to the phagocytic action of the trophoblast, and that the gestation itself became converted into a mole from blood extravasation between amnion and chorion. The "mole," if completely detached, and if the ostium abdominale were patent, might then be expelled by blood effusion and tubal muscular action into the pelvis—complete

tubal abortion. The same mechanism might account for incomplete tubal abortions like the second case, but possibly that specimen might really be an infundibular pregnancy simulating incomplete tubal abortion.

Glasgow Obstetrical and Gynæcological Society

THE ninth and last ordinary meeting for the current session was held on May 25—the President, Dr Stark, in the chair.

The following specimens were shown:—(*a*) a modification of Bossi's dilator, by Dr Munro Kerr; (*b*) two specimens of extra-uterine pregnancy by Dr J. K. Kelly; (*c*) a specimen of hydro-salpinx and one of hæmato-salpinx, shown by Dr Miller, for Dr Stuart Nairne.

1. Dr J. Munro Kerr read a paper on rupture of the uterus through the old scar of a Cæsarean section. The incision had been fundal, passing through the placenta; the tubes were not divided and recovery was good. When readmitted to hospital in the thirty-eighth week of her pregnancy, there was abdominal tenderness which increased as labour went on, and the fœtal parts could easily be felt on palpation. *Per vaginam* the presenting part could not be felt and the finger was blood-stained. Laparotomy was performed and the peritoneal cavity was found filled with dark fluid blood. The membranes were intact, and the contained fœtus (dead) was lying below the diaphragm. The uterus had retracted well. The rupture was through the old scar; hysterectomy was performed and the patient did well. Dr Kerr considered that the transverse incision (especially if through the placental site) leaves a weak cicatrix; the walls had been stitched with catgut. He stated that similar cases had been reported by Galabin, Horrocks and Abel.

Professor Cameron, Dr Jardine and the President spoke on the case, and Dr Kerr replied.

2. Professor Murdoch Cameron read short notes of a case of large mesenteric cyst which he had removed. The patient had had enlargement of the abdomen for ten years, with pain round the navel; menstruation was regular. On operation, the cyst walls were found to be thick and adherent; there was a pedicle present. The fluid in the cyst amounted to 33 pints. The pathologist's report on the cyst was that it contained some kidney tissue in its wall; the fluid was alkaline, spec. grav. 1011, and contained leucocytes, epithelial cells, fat globules, and a small amount of albumin; it also responded to the test for

peptones. The cyst had probably developed from remains of the Wolffian body.

Dr J. K. Kelly and the President spoke, and Professor Cameron replied.

3. Dr Ritchie and Dr Taylor showed a fœtus with malposition of thoracic and abdominal organs. The heart was displaced to the right side, and the stomach, duodenum, spleen, and left half of the liver formed a hernia through the diaphragm covered with peritoneum and pleura. The left half of the diaphragm was absent. An excellent drawing of the specimen, by Dr J. Lindsay, was exhibited.

At the close of the meeting the following office-bearers were elected for the ensuing year:—Hon. President, Dr Chas. J. Cullingworth. President, Dr J. K. Kelly. Vice-Presidents, Dr Andrew Richmond and Dr J. Lindsay. Treasurer, Dr Geo. Turner. Secretary, Dr Geo. Balfour Marshall. Editorial Secretary, Dr A. N. M'Lellan. Reporting Secretary, Dr A. Louise M'Ilroy.

POOR LAW MEDICAL RELIEF

BY A FORMER IN-DOOR MEDICAL OFFICER

THE recently issued blue-books on Poor Law Medical Relief in Scotland teem with evidence of the urgent call for the enquiry, the results of which are now so lucidly placed before the public. The medical profession has just cause for satisfaction, inasmuch as now for the first time there is official recognition of the very valuable work that is being quietly done all over the country by those of its members who are engaged in the Poor Law medical service, whether in-door or out-door. The report states that although the medical officer is the only poorhouse official who holds a direct statutory appointment (according to the Act of 1845), yet the rules and regulations at present in force do not give him the position as one of the official staff of the poorhouse to which he seems to be entitled. The committee have accordingly endeavoured to put matters on a better footing, for they not unnaturally look on the medical officer as in several ways the most valuable official, a view in harmony with the law that no able-bodied person is entitled to Poor Law relief in Scotland. It is to be hoped that this attitude will be reflected in the bearing of Parish Councillors and others, and that medical officers themselves will not be so averse to magnifying their office as they have for various reasons been in the past.

It is a little difficult to forecast the full effect of the suggested

changes. I have no doubt that the condition of the sick poor will benefit in no inconsiderable measure by the more direct control of the medical officer over all matters that deal with their welfare, and this is of course the prime consideration. At the same time it will be found, I believe, that many medical officers to large or even medium-sized poorhouses will be unable as hitherto to carry on a fair general practice along with the additional poorhouse duties.

What are some of those added duties? The medical officer is to inspect all children and infants at least once a week. He is to have the care of the general health of the inmates; he is to inspect quarterly every part of the poorhouse, and note anything therein likely to be injurious to the health of the inmates, especially whether the ventilation, heating and sanitary arrangements are sufficiently provided for and properly attended to, and whether there is over-crowding. The result is to be noted in a journal, and if there is defect it is to be reported. He is to revise the diet of the sick at least once every four weeks, to inspect "frequently" the food, cooked and uncooked, and report thereon to the governor when necessary. He is to "keep a register of deaths with full particulars as to the nature of the deceased's illness, and any other data that may appear to him of importance." (Report, paragraph 105.) The actual rule suggested [xlviii. (8)] defines what is wanted in a more limited sense than one might gather from the above sentence. He is to prepare an annual report for the House Committee and the Local Government Board after the style of those drawn up by medical officers of health. He is to "revise the classification of all the inmates periodically at such intervals as may be directed by the House Committee and approved by the Local Government Board, by examining each inmate as to his or her physical condition and fitness . . . and to certify the result in a book kept for the purpose." Further, the greater discretionary power which is expected to be exercised in dieting, the more specialised treatment of cases of phthisis, the easier access of all who have any medical complaints, the stricter insistence on rules as to time of seeing all new admissions, the regulations as to bathing and punishment, the improvements in nursing, and the transference of certain administrative functions from the governor—all these changes add in a very notable degree to the work of the medical officer.

I do not think the standard of the new rules is pitched too high. They have, it is clear, been drawn up after most careful consideration, and after exhaustive enquiry from those who are well able to advise, and they are founded on the best practice in some of our own poorhouses, on the prison rules for Scotland, on

the English system, etc. The rules make for efficiency, for thoroughness, for order; they may not abolish slip-shod methods, cursory examinations, and superficial diagnoses, but their tendency will be in the right direction. They will help to clear up ideas, which, to judge from the evidence, have been rather hazy on many points, and they will promote a much-wanted uniformity in methods of classification and treatment. The polite but firm insistence of the Local Government Board will in course of time raise the standard of treatment of the sick poor even in districts where the local authorities at first prove refractory, backward or indolent.

A great increase of work such as I have briefly outlined must naturally involve *increased pay for the medical officers.* This, unfortunately, is not so easy to bring about as a change of rules; it cannot be dictated by the Local Government Board, though the allocation of the grant for medical relief gives a certain amount of leverage to this body. The annual grant was fixed at £20,000 in 1882. It does not grow with the expenditure as in England and Ireland, nor has Scotland her proper equivalent. The vast changes involved in the adoption of trained sick nursing and those now contemplated make a substantial addition a matter of serious importance.

A table (Appendix LI.) shows the salaries of in-door medical officers; from this it appears (to take only the larger houses) that in Aberdeen the cost is 4s. 5d. per head of the average number of inmates, excluding lunatics; in Dundee, 5s. 6d.; in Edinburgh, 8s. 2d.; and in Glasgow, 9s. 8d. In the smaller houses much greater disparity is shown, and the report suggests the need for revision. In view of the adoption of the new rules, the parochial medical officers should form a union with the object of bringing about a uniform and higher rate of pay; they might with confidence count on the backing of the rest of the profession. But many Parish Councils only require to have the case properly laid before them to be induced to act justly if not generously. Not only should the salaries be increased, but in many cases the *staff should be augmented.* As things are at present, even in the large poorhouse hospitals, the medical staff is much too small for efficiency. The natural consequence is that the residents soon have any initial enthusiasm knocked out of them, and fall into easy-going ways. Unless in very special circumstances, the training a young medical gets in one of these hospitals is very much inferior to that of a good infirmary, especially if it is affiliated to a teaching school. The main reason for this is, I believe, inadequate staffing. It is impossible that a poorhouse hospital with over 300 beds can be properly worked by a visiting and a resident physician, not to speak of

the extra work required for the adjoining ordinary poorhouse, including 100 lunatics. This point seems to have been altogether overlooked in the enquiry.

The powers proposed to be given to the medical officer to call in a medical practitioner for consultation or operation, to employ extra nursing, and to send suitable cases to the nearest general infirmary, are distinct steps forward.

The whole treatment of the *nursing* question is satisfactory, but I have no space to go over the points in detail. While revolutionary changes have to be avoided, the measures suggested ought in a few years to produce a vast improvement. The suggestion that when a matronship falls vacant in a small poorhouse, a trained nurse should if possible get the post, is excellent.

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There is no reference to the desirability of using the poorhouse hospitals for clinical teaching. This has been often mooted in medical journals, and the effect of such a practice would, I believe, be beneficial and stimulating all round, and hurtful to none. It has been my privilege to give occasional demonstrations on the more rare and interesting cases to small groups of students, and this with much appreciation on the part of the students, as well as interest on the part of the patients. German medicine owes no small part of its lofty position to the use it has made of the valuable "material" in what correspond to our poorhouse hospitals.

The new rules will affect in important ways the *relations between the governor of the poorhouse and the medical officer.* It is whispered that idyllic harmony, as in the garden of Eden before the Fall, has not always reigned between those officials, and one can read as much between the lines of some of the printed evidence. Probably more may have been said in the secret chamber of a friendly or unbiassed inquisition. The elements of discord exist at present, and while, as the report says, it is satisfactory to find that in many poorhouses everything connected with the treatment of the sick is left to the medical officer, in others lay officials, by simply following out the rules, have the power of undoing in ignorance such good as may result from the medical officer's treatment. The latter may see grave defects in diet, sanitation and so forth, and may make suggestions as to alterations to the House-Committee, but in practice this has not worked well. As one witness put it, "it would be rather a mean thing to go and write on any defect which the governor could put right. I think the medical officer's first duty would be to call the governor's attention to it and ask the governor to see that it was done. If the governor does not do that, then there will be the usual row." Even in

the sick wards the governor may exercise his rights with fatal results to peaceful relations. He may, for instance, select nurses and probationers, and dismiss them without consulting the medical officer. The new suggestions are "that the medical officer should be the chief executive officer of the hospital or sick wards, and that he should be responsible to the House-Committee for their management. Where he resides in the poorhouse, the sick should be entirely under his charge as regards treatment and discipline. His disciplinary control should, in our opinion, include such matters as (*a*) the heating and ventilation of the wards; (*b*) the supervision of the nursing arrangements; (*c*) the suspension from office, if necessary, of any paid official employed in the hospital or sick wards; and (*d*) the general management of the sick wards." "In poorhouses where there is no resident medical officer—which are a large majority—the governor should have power to supervise the discipline of the sick wards in the absence of the medical officer. Any report that he may have to make should be submitted to the medical officer, to deal with as he sees fit." More details are given, but it is not necessary to quote further. On the whole, the plans seem to be as full of common sense as could be devised in what must be a more or less difficult and delicate dual relationship, and while nothing will prevent "the usual row" if there is want of gentlemanly feeling on both sides, the medical officer who knows the rules should find little to offend his *amour propre*.

Return of the Births and Deaths in Eight of the Principal Towns of Scotland in May 1904

DURING the month of May 1904, there were registered in the towns of Glasgow, Edinburgh, Dundee, Aberdeen, Paisley, Leith, Greenock, and Perth, the births of 4443 living children, of whom 2256 were male and 2187 female. These births are equivalent to an annual birth-rate of 30.3 per thousand of the estimated population of these towns. The birth-rate during the month was highest in Greenock, 38.3; and lowest in Edinburgh, 24.7. In Aberdeen, it was 33.1; in Glasgow, 32.3; in Dundee, 29.3; in Paisley, 28.7; in Leith, 26.8; and in Perth, 25.7. In April the birth-rate was 30.2, and in May 1903 it was 31.5.

Deaths registered during the month numbered 2661. This is equivalent to an annual death-rate of 18.2 per thousand of the estimated population of these towns. Of the deaths 1399

were of males, and 1262 of females. Compared with the returns for April, the deaths of this month numbered 213 fewer, and the death-rate 2.1 less. Compared with those of May 1903, the deaths were 164 more, and the death-rate 0.9 more.

The highest death-rate for the month is recorded in Dundee, 20.0; and the lowest in Leith, 14.9. In Glasgow it was 18.7; in Edinburgh, 17.9; in Greenock, 17.2; in Paisley and Perth, 17.0; and in Aberdeen, 16.9. With the exception of that of Edinburgh, each of these rates is less than the corresponding rate for April. In Edinburgh the death-rate is the same as that for April.

Of the 2661 deaths, 920, or 34.6 per cent., were of children of less than five years of age, and 657, or 24.7 per cent., were of persons of over 60 years of age. Compared to the deaths of April, the deaths of children were 64 fewer, and deaths of old people 56 fewer.

The deaths are recorded of 517 children of less than one year old. This is equivalent to an infantile mortality of 120 per thousand births. These deaths number 66 fewer than in April, and the rate is 20 less than in April. The infantile mortality rate for the month was highest in Greenock, 155, and lowest in Perth, 71. In Aberdeen it was 144; in Dundee, 127; in Glasgow, 123; in Edinburgh, 110; in Paisley, 86; and in Leith, 79. In Greenock this rate was higher than in April; in the rest of these towns it was lower.

The seven principal epidemic diseases accounted for 253 deaths; this is 20 fewer than in April, but is 19 more than in May 1903. The death-rate from these causes was highest in Greenock, 2.87; and lowest in Perth, 0.70. In Dundee it was 2.31; in Glasgow, 1.83; in Paisley, 1.82; in Aberdeen, 1.66; in Edinburgh, 1.28; and in Leith, 0.88.

Deaths from small-pox numbered 10, which is 8 fewer than in April; of them 8 were in Glasgow, and 1 each in Paisley and Greenock. Of the ten, 7 were deaths of vaccinated persons, 2 of unvaccinated persons, and 1 of a person whose vaccination was doubtful.

Deaths from pneumonia numbered 228, and constituted 8.6 per cent. of the total deaths; deaths from bronchitis numbered 162, and were 6.1 per cent. of the total; and deaths from phthisis numbered 287, and were 10.8 per cent. of the total. Deaths from phthisis were slightly more than in April, but those from bronchitis and pneumonia were fewer.

The Meteorological Returns for Eight of the Principal Towns in Scotland for the Month of May 1904

Mean barometric pressure, 29.874 inches ; less than the average for the same month of 1856-1900 by 0.073 inch.
Mean temperature, 49°.0 ; less by 0°.1.
Mean daily range of temperature, 14°.0 ; less by 0°.9.
Mean humidity, 80 per cent. ; being the average.
Rain, number of days, 19 ; greater by 5 days.
Rain, depth in inches, 2.90 ; greater by 0.74 inch.
Wind, Mean Force (on Scale of 0-12), 2.7 ; greater by 0.2.
Wind, direction of: a 4 days' excess of winds from N.E. and S.E.

HENCE the month of May 1904 was characterised by a rather low mean barometer ; a mean temperature about the average, with a slightly low mean daily range ; a somewhat high mean rainfall, with an unusually large number of rainy days ; a considerable excess of winds of fully average force from N.E. and S.E.

The mean barometric pressure was 29.874 inches, being 0.073 inch below the normal. Lowest readings were everywhere noted on the 2nd, and highest on 19th, 20th, or during the last four days of the month, the sea-level extremes at Leith being 30.204 inches on the 20th and 29.247 inches on the 2nd.

The mean temperature was 49°.0, or 0°.1 below the normal, the days being 0°.6 below and the days 0°.4 above their respective averages. The greatest difference at any of the towns was a defect of 0°.7 at Greenock. At most stations the minimum for the month was registered on the 8th, but at a few it fell on the 12th and 20th. At none of the towns was frost in shade reported, but ground frosts occurred on 1st, 8th, 12th, and 20th at Edinburgh, and on 3rd, 8th, 20th, and 25th at Paisley. The maximum of the month generally occurred on the 16th, or during the last three days of the month. The absolute maximum for the chief towns was 70°.6 at Leith on the 16th, and the minimum 32°.8 at Edinburgh, on the 8th.

The mean rainfall was 2.90 inches, or 34 per cent. above the normal. All the reporting towns had a rainfall above the average, but the excess was small at Greenock and Paisley, whilst at Dundee and Aberdeen it was about 35, and in the Edinburgh district nearly 70 per cent. Aberdeen, Dundee, and Paisley registered about a third of their amounts during the first week of the month, and rain was general in all districts from 1st

to 9th. Eastern districts experienced another wet spell from 23rd to 28th, whilst the third week of the month was rainless at Dundee, and almost so at some of the other towns. The heaviest daily falls were 0.82 inch at Aberdeen on 4th, and 0.71 inch at Leith on 24th.

Hail was reported at most of the towns on the 7th, at Paisley also on 2nd, 3rd, 4th, and 17th, and at Aberdeen on 17th.

Thunder was noted at Aberdeen on 18th, at Ben Nevis on 1st, at Braemar on 1st and 26th, at Fort-William on 1st, 13th, and 26th, and at Lednathie on 16th, 24th, and 26th.

Recent Literature

CRITICAL SUMMARIES AND ABSTRACTS

MEDICINE

By J. MACKIE WHYTE, M.A., M.D.,
Physician to Dundee Royal Infirmary

Treatment of Typhoid Fever (Friedrich Müller, *Therapie der Gegenwart*, Nos. 1 and 2, 1904).—Typhoid fever seems to be at present on the increase in Germany, and the cases seem to be of a more severe type than they were over twenty years ago, when Liebermeister's cold bath treatment was so widely employed. Müller notes that this increase in numbers is apt to be coupled with increase in severity, and the reverse may be observed in the declining stage of an epidemic. He uses as his text in this paper 87 cases treated by him in Basle during three years, 1899-1902, and for purposes of comparison he takes Immermann's statistics in the same hospital from 1878 to 1899 (2796 cases). This latter group was treated by a uniform method throughout—calomel to start with, strictly fluid diet till well on in convalescence, and hydrotherapeutics after the fashion of Liebermeister and Ziemssen. The percentage mortality in the former group was 12, in the latter 10.4. Amongst the causes of death, the first place in these, as in other statistics, is taken by the severity of the infection. To meet this we are still without any specific, and the experiences of English physicians in the South African war with serum treatment are regarded as by no means encouraging. As little faith is placed in initial treatment with calomel, which is not a genuine intestinal disinfectant. Cases treated with it before admission (and they were many) were found to be neither

better nor worse than those that had none. It is not at all certain how this intoxication acts. One view is that it is through lowering of blood pressure, as in diphtheria, pneumonia, and other infections, and certainly the blood pressure is often strikingly low in typhoid. A frequent, small, soft pulse is a sign of danger, and demands appropriate treatment, even though it may be but an indication of the action of the poison on the whole organism. Digitalis is useless, but *caffein*, given subcutaneously every two hours to the extent of 1 to 2 grains per day, has sometimes an excellent effect. It is probable that the lowered pressure is closely related to a paralytic dilatation of the vessels in the splanchnic area, often accompanied by meteorism. A large, heavy ice-bag on the abdomen is often of real value.

Alcohol is still relied on by many physicians as one of the best means of "strengthening" the heart; indeed, they would look on it as malpraxis to treat a case of typhoid without strong wines, or the mixture that goes by the name of Stokes. In Basle, alcohol was not given in typhoid any more than in pneumonia or influenza; indeed, in the case of the latter disease, it more often produced a disagreeable excitement of the heart's activity and of the whole nervous system than any real improvement of the pulse. Small quantities of wine were given only in protracted cases where there was loss of appetite and danger of inanition. Müller thinks nothing but harm can result from large doses of port, champagne, cognac, etc., this being shown by the fœtid loading of the tongue and tendency to vomit.

Cold bathing is believed to be very valuable, but not by reducing temperature, as Liebermeister taught. It has a refreshing, stimulating effect, and by exciting deep respiration it prevents atelectasis and broncho-pneumonia. It is no longer thought necessary to plunge the patient in a cold bath every few hours till be becomes blue. Cold laving, or, in the case of weak patients, cold sponging, is enough, and a warm bag may be given to prevent a rigor with its rise of temperature. Modern German practice thus comes into line with what British physicians have almost unanimously held, that systematic cold bathing in Liebermeister's sense is entirely unnecessary, and in some respects harmful.

Müller next advocates a much less restricted *diet* than is commonly allowed, believing that certain complications, such as bed sores, erysipelas, and parotitis, may be attributed to the loss of resisting power which goes with the extreme loss of weight in prolonged cases, fed only on milk or other fluids. In his 87 cases he gave as nutritious a diet as possible, avoiding gristle and skin of meat, and indigestible forms of fruit or

vegetables. In addition to a litre of milk or more, patients got various kinds of tender meat, puddings, spinach, stewed apples, rusks, dry toast, mashed potatoes, and so on. The chewing of rusks gives pleasure to the patient and helps to keep the mouth clean. Such a diet, Müller argues, becomes fluid long before it reaches the ileo-cæcal valve, and, as a matter of experience, it has not been productive of intestinal hæmorrhage or perforation, nor have relapses been frequent. Often in the earlier stages there is great loss of appetite, and in other cases a tendency to vomit. In such cases, and also where hæmorrhage or peritoneal irritation threatens, it is necessary to give only a minimum amount of nourishment. A number of references are given, showing there is at present a tendency towards a more liberal dietary in typhoid.

Pneumonia, one of the chief causes of death in typhoid, can be guarded against in some cases by careful attention to cleansing the mouth by rinsing and brushing, and also by preventing mouth-breathing. Supporting the chin by a pad or light bandage is useful where the jaw falls through weakness; Keeping the nostrils clear by a spray of 1 per cent. salt solution, warmed, is also good; and so is frequent (half-hourly) changing of the patient's position. The rest of the paper is mainly occupied with a discussion of complications in the urinary and nervous systems, and of the question of contagiousness.

In this summary the diet question is the one that is most likely to give rise to discussion. The figures given are too limited to allow of safe deductions being drawn from them in regard to the safety or risk of any mode of treatment, and one remembers how the aid of statistics on a vast scale has been called in to force the profession to adopt some therapeutic measure, cold baths, for example, which time has altogether failed to justify. One is free to admit that in extremely few cases of relapse in typhoid has there been any sufficient cause in the way of indigestible food. Whether, indeed, the classical currant bun, or mutton chop, or piece of cheese that have pointed the moral for many a clinical lecture for the warning of students, nurses and patients, whether these things have ever caused a genuine relapse is on theoretical grounds more than dubious. In the great majority of hospital cases the diet can not in any way be blamed. Nevertheless the rule is a good one that no indigestible articles should be allowed till the intestinal lesions are presumably soundly healed. It is well to have a clear idea as to the liquefaction of the various food elements in the upper part of the alimentary canal. One still sometimes hears of suet pudding and other doughy materials as the best wrappings for some sharp-pointed foreign body that has

inadvertently got into the stomach; fortunately this much tried organ can, as a rule, deal effectively both with the foreign body and the dough. It is well then to dismiss from one's mind as a bugbear the idea that the solid articles of food which may be allowed will necessarily reach the ileum as such. Still, such a thing may happen, especially if too much is given, or if the digestive powers are notably decreased, as they doubtless are in typhoid as in other feverish disorders. The rule is a good one to inspect the stools carefully for evidence of indigestion; even when milk alone is given, not uncommonly curdy lumps are found. A change of diet may benefit the patient; the monotony of milk, milk, milk, can only be realised by those who have had perforce to submit. The writer can recall one case where the temperature kept at an uncomfortable height for weeks on a purely milk diet; the diagnosis of typhoid was unmistakable; there were no complications; not till the patient was put on "light diet" at the suggestion of a colleague did the feverishness leave, but the drop was so marked that there was little room for doubt as to the cause of the improvement, though the explanation of the *modus operandi* remains obscure. In other cases a natural intolerance of milk forces the physician to choose between any risks there may be in other diet and starving the patient to a dangerous degree. The safest conclusion seems to be that patients with typhoid should be fed very much like those who are suffering from any feverish disorder likely to last for three or four weeks; that abundance of water is essential; that milk should be the mainstay, especially in the earlier stages; that if the appetite is keen it may be judiciously appeased by a considerable variety of liquid and solid foods (the motions being regularly inspected), but that it is more dangerous to overload the body than to underfeed. "Feeding fevers" implies a wide and judicious view of what feeding means.

FEVERS

By CLAUDE B. KER, M.D., F.R.C.P.,
Medical Superintendent, Edinburgh City Hospital

Congenital Smallpox.—Taconnet (*L'Echo Médical du Nord*, December 14th, 1902) reports an interesting case which came under his observation at the Charité Hospital.

On the 19th of November a woman of 26 presented herself at the hospital with an infant suffering from smallpox. It was noticed that she herself was in the later crusting stage of the

disease, and both were therefore detained. It was ascertained that on the 4th of November, very nearly at the term of her pregnancy, she suffered from a rigor followed by headache. Next day nausea and pain in the back were complained of. While still in the invasion period of the fever she was delivered on the 6th November. On the 9th, papules appeared on the face, wrists and limbs, the trunk being very slightly attacked by the eruption, which ran a rapid course, drying into crusts in a few days. The patient had been vaccinated in infancy only.

The infant, normal at birth, was not protected by vaccination. On the eighth day after birth, the 14th November, the rash appeared, and when the child was admitted to hospital it was found to be suffering from a severe confluent attack. Death supervened on the ninth day of the eruption. If three days are allowed for the period of invasion, which in so young a child was unnoticed, the disease apparently started five days after birth. The fœtus was therefore infected, and a part of the incubation period was passed *in utero*. The interest of this case is its rarity, Taconnet being unable to find more than one similar case, that of Richardière, in which the mother had a mild attack of varioloid immediately after her confinement, her infant developing an attack, also trivial, four days after birth. In Taconnet's case, however, the child suffered very severely, the mother's attack, modified as it was no doubt by vaccination, being mild. No immunity, therefore, even of a partial character was transferred to the fœtus.

The Hydro-therapeutic Treatment of Typhoid Fever.—Favill (*Medical Age*, December 1902) pleads for the more general use of the cold bath in private practice. Statistically, in his opinion, the question does not deserve discussion. All statistics go to prove the Brand treatment yields a decidedly decreased mortality. Favill rightly lays great stress on the manipulation of the patient while in the bath, which is an essential part of the process. He points out also that the antipyretic value of the bath, while great and important, is overshadowed by its value as a sedative and as a tonic. Firstly, the patient experiences a sense of comfort, and sleeps much more satisfactorily. Secondly, his mental dulness is dissipated; he becomes alert instead of indifferent. His cerebral condition is altogether improved. These results are largely due to increased elimination, as is borne out first by the actual increase in the amount of urine excreted, and secondly, by the increased amount of toxin contained in it. Favill is inclined to recommend slight modifications of the treatment for use in private practice, and to secure efficient training of nurses suggests that it would be well to apply them

also to work in hospital. He "builds" the bath in the patient's bed, probably with some arrangement of Macintosh sheeting, but details are not given, and pours water over the patient instead of putting him into an ordinary bath tub. Ice has to be frequently added as the water warms too quickly under these conditions. The friction process is to be kept up constantly. This plan can be carried out in any private house. The objection likely to be raised by the patient or his friends to this manner of treatment is not to be considered. It is no real obstacle and it is the physician's business to insist on what he believes the best treatment.

The bath treatment of typhoid is so little in favour in this country that Dr Favill's plea is likely to fall on stony ground so far as Great Britain is concerned. It is gratifying to note that the eliminative action of the bath is considered of more value than its antipyretic effect. It is no doubt due to the increased excretion of toxin, caused apparently by the general tonic effect of the bath on the nervous system, that the Brand treatment has given such good results. The physician, however, who seriously applied it to all his patients in this country would probably meet with an opposition so serious that even his sense of the "moral obligation" to use it might well fail.

Treatment of Typhoid Hæmorrhage.—M'Cormick (*Therapeutic Gazette*, Aug. 15th, 1903) has an interesting article on the treatment of typhoid fever, based on the experience of over 400 cases. The point of most interest is the method which he employs for dealing with intestinal hæmorrhage. He regards the method most in vogue, that is to say, the use of opium, as most dangerous to the patient, and considers that nothing is to be gained by attempting to control peristaltic action. His objections to opium are that it locks up the secretions and encourages the collection of gas which, by distending the gut, adds to the chances of perforation. His own method is distinctly revolutionary. He washes out the colon with large amounts of normal saline solution, and if the hæmorrhage has been profuse injects saline also subcutaneously. Ergot and icebags are also employed. His death-rate for hæmorrhage cases is certainly low, but we would require more evidence before we give up treatment by opium. It is perfectly possible that where the hæmorrhage is only slight the use of opium may be unnecessary and, in so far as it interferes with free excretion of toxins, even harmful. But in a really profuse hæmorrhage it undoubtedly saves life by putting the bowel at rest and allowing of the natural arrest of hæmorrhage, and it also allows the patient to be more completely and thoroughly starved, which is a great

advantage, as the bowel thereby secures more complete rest. It is perfectly probable that, if patients were fed as usual after a hæmorrhage and were given opium at the same time, there would be stagnation of undigested food and evolution of gas. But when all food is cut off, for say 36 hours after the hæmorrhage, and when the patient has not been injudiciously fed before he bleeds, there is little or no tendency to tympanites. The great objection to opium will always be the fact that it may mask the occurrence of a perforation.

M'Cormick has also experimented with acid sulphate of soda as a general antiseptic during the fever. He concludes that it is bactericidal to the bacillus typhosus in 1-300 solution and that it is not in any way toxic. It neutralises typhotoxin and should therefore lessen delirium and toxic symptoms. He also believes that it prevents to a great degree the congestion of Peyer's patches. He has only treated a few cases with the drug but has had encouraging results.

Protozoon-like Bodies in Scarlatina.—Mallory (*Journal of Medical Research*, Jan. 1904) has noted in the skin of four cases of scarlatina certain bodies which appear to be protozoa and to be analogous to the malarial parasite. In their morphology they suggest that they may be various stages in the developmental cycle of a protozoon. They occur in and between the epithelial cells in the epidermis and free in the superficial lymph vessels and spaces of the corium. The majority of these bodies vary from two to seven microns in diameter, and stain delicately but sharply with methylene blue. They may be broadly divided into two groups. The first of these consists of round, oval, elongated, and lobulated bodies composed of a finely granular reticulum. Occasionally they contain larger granules which stain more deeply. Others show vacuolation. The frequently elongated and lobulated forms suggest fixation while in a state of amœboid motion. The second main group of bodies is remarkable for their radiate structure. The bodies are usually spherical and contain a round central mass from which radiate from ten to eighteen narrow segments which in some cases are united, but in others sharply separated from each other. Occasionally they are also found separated from the central body, but the general appearance seems to be that of a rosette. Between these two main groups are coarsely reticulated forms which may represent stages in sporogony or be merely due to degeneration of the other forms. Mallory suggests that all these different appearances are due to the changes in the life history of the same protozoon. He is inclined to believe that this organism is the causal agent of scarlatina, although he has

had many negative results when examining pieces of skin from living patients and has not yet found any trace of the protozoon in the blood, nasal and lachrymal discharges, and desquamated skin. He suggests the name of Cyclaster scarlatinalis for it in consequence of the frequent wheel and star shapes which it presents. He believes that if it was a normal inhabitant of the skin it could not have been overlooked in the recent microscopical work done on the skin. Moreover, it was not observed in 54 cases of smallpox in which the skin was thoroughly examined by the same staining and fixing methods.

That Mallory may be on the right track in referring the cause of scarlatina to a protozoon is not at all improbable. The bacteriology of the disease is, to say the least of it, unsatisfactory. There are not a few of us who are not prepared to accept the streptococcus to which many attribute the fever, and the diplococcus described by Class stands much upon the same level. Moreover, recent work on smallpox leads us to believe that a protozoon is the cause of that infection, and what is true of one eruptive fever may well be so of another.

Treatment of Scarlatina by Anti-streptococcic Serum.—Kosinski (*Gaz. Lekawka*, 10th Oct. 1903; *Semaine Médicale*, 6th April 1904) has treated thirty-eight cases of scarlatina with anti-streptococcic serum. According to him, the temperature falls rapidly and the rash disappears quickly. The temperature may rise afterwards if there is inflammation of the throat or nose. It is interesting to find that the enanthem on the throat and palate does not as rapidly disappear as the exanthem. The use of the serum would not appear to prevent renal complications, two out of the three fatal cases having died of nephritis. These results, owing to the small number of cases, are not very convincing. Even with no treatment at all, the scarlatinal eruption is in many cases exceedingly evanescent, and it is very difficult to admit that the rapid disappearance of a rash is due to the use of serum. After all, the use of anti-streptococcic serum, except in cases of septic scarlatina, is a little premature, as it is by no means universally allowed that scarlatina is due to a streptococcus. As will be seen in the preceding note, it is quite possible that the streptococcus has nothing to do with its causation.

Variation in Weight in Scarlatina.—Garnier and Sabaréanu (*Presse Médicale*, 23rd March 1904) have made observations on the weight of ten adult male patients suffering from scarlatina. It is natural to suppose that the weight is liable to vary inversely with the temperature, as Thaon has suggested is the

case in enteric fever. The patients were weighed every morning and the observers charted the results and studied the resulting curve in comparison with the curve on the temperature chart. They found that the curves may be classed under two types. In some cases the weight fell at once from the moment the patient entered hospital. A minimum was rapidly reached —and was maintained for several days. Thereafter the weight rapidly increased, and in most cases soon exceeded the amount registered on admission. The other type, however, was more interesting. The weight at first remained the same or actually increased. After a few days a decrease in weight occurred, and thereafter the curve rose to a level as high or higher than at admission. The diminution in weight was usually more than 8 lbs. and sometimes exceeded 2½ lbs. per day. The writers conclude that the fall in weight coincides broadly with the fall in temperature, and that in the early days of the fever there is little or no loss. It appears to be independent of the great discharge of urine which occasionally occurs.

The increase in weight is postponed till the patient is taken off a rigid milk diet. As long as milk only is given, there will be no true convalescence, which may be regarded as starting when the patient begins to regain the weight which he has lost. It is therefore undesirable to maintain the milk diet too long, and it is suggested that it may be modified after the fourteenth day. This is quite in accordance with experience in this country, where frequently additions are made to the diet as soon as the temperature falls. It is somewhat curious, however, that weight should not be lost during the time the fever is at its height, as this is certainly not the case in such fevers as enteric or typhus, where the wasting is evident long before the temperature shows any sign of falling.

SURGERY

By W. J. STUART, M.A., M.B., F.R.C.S.,
Assistant Surgeon, Deaconess Hospital, Edinburgh

THE HEIGHTENED RESISTANCE OF THE PERITONEUM IN ACUTE APPENDICITIS, AND ITS BEARING UPON OPERATIVE PROCEDURE

IN view of the alarming increase in the literature of the appendix, some apology is required for taking up this subject. The justification is that the facts to be put forward support a heterodox view regarding the operative treatment of acute

appendicitis. That view is that in all cases of abscess or diffuse peritonitis originating in the appendix, the removal of the appendix should be carried out, even though the search and removal involve extensive tearing of adhesions and free opening of the peritoneal cavity; and that the dread of thereby causing a general spread of infection is without foundation. That this is a heterodox position will scarcely be denied. The great majority of surgeons, having opened an appendicular abscess, are content to drain it, and make no attempt to remove the appendix, unless it is lying free in the abscess cavity. Kocher says that "the most important point is not to perform a radical cure by removal of the appendix, but to remove the pressing danger." Jacobson considers that "where it forms part of the abscess wall, or where it cannot be found after a reasonable search, the wiser and safer plan will be to leave it." Treves, Watson Cheyne, Greig Smith, Park, M'Burney, and many others have all expressed a similar opinion. Comparatively few writers take up the opposite position. Murphy is stated to remove the appendix in all suppurative cases. In this country Lockwood follows the same course; he believes that "it is better to take the immediate risk of a determined attempt to remove the appendix," unless the patient be so weak that the prolongation of the operation may be fatal. On the Continent, Rehn of Frankfurt and Sprengel have formulated and carried out a similar rule in the treatment of the numerous patients who come under their care, and their results are better than those of more conservative surgeons, while, on the generally accepted theory, their mortality should be enormous. Although the average surgeon does not explain away this apparent contradiction, we shall not be far wrong in assuming that he is thankful to find that an abscess is adherent to the abdominal wall, and can be drained without opening the general peritoneal cavity, and that he spends anxious hours when the situation of the abscess has compelled him to pass through the abdominal cavity and separate circumscribing adhesions.

In a recent number of the *Archiv für klinische Chirurgie* Dr Ludwig Moszkowicz, writing from the Rudolfinerhaus in Wien-Döbling, publishes statistics and puts forward theories which at least furnish food for thought, and it is to them that special attention will be here directed. His method of operating may be first described. Using the ordinary oblique incision, he divides muscles and fasciæ in the same line, employing the gridiron method only in the earliest stages of inflammation. Should the primary incision open the abscess, its walls are carefully swabbed and examined. If the organs forming the wall of the abscess are unrecognisable, then by

careful separation of the adherent parietal peritoneum, sometimes by resection of a piece of omentum, the cæcum and appendix are exposed and freed from adhesions, the appendix is removed by the usual invagination method, and the stump is covered by the remains of its mesentery or by a fold of omentum. Space is left for the emergence of a rubber drainage tube and iodoform gauze, and the rest of the wound is sewn up in layers. During the operation the general peritoneal cavity is usually opened into. Should the abscess not be adherent to the abdominal wall, the primary incision will at once open into the abdominal cavity. In that case the area of resistance is carefully surrounded with gauze, and the abscess opened by separation of adhesions. The appendix is then sought for and removed as in the previous case. The systematic search for the appendix often results in the opening up of multiple abscesses, which would have remained unsuspected and unopened, probably with a fatal result, had the surgeon contented himself with simple drainage of the collection of pus which he had first discovered. The wounds heal with surprising rapidity.

During the last two years Moszkowicz has operated upon 63 cases of acute appendicitis, and, with the exception of 4 patients who were in a condition which rendered dangerous the slightest prolongation of the operation, has in every instance removed the appendix by the method above described. The cases are divided into 5 groups:—(1) In 6 patients *no abscess* existed, and all recovered; (2) in 11 the abscess was *parietal, i.e.* adherent to the anterior abdominal wall, and the only death was that of a weak old man with complete obstruction, in whom the formation of an artificial anus in the ileum was necessary; (3) in 13 in whom the abscess was *central, i.e.* only accessible through the general peritoneal cavity, no death occurred; (4) *multiple* abscesses were present in 19, of whom 8 died; (5) *diffuse peritonitis* was only fatal in 2 out of 14 cases. A mortality of 11 in 63 cases, or about 17 per cent., is as low as is furnished by most statistics, and lower than many; while the appendix is gone, and recurrence impossible.

These details are worthy of more than a mere glance. The "parietal" and "central" abscess cases show practically no mortality, though the general abdominal cavity was so often opened into during removal of the appendix. The patients with multiple abscesses throughout the abdomen furnish nearly three-fourths of the total deaths, but even here the proportion of recoveries—11 out of 19—is above the average; and in many of the post-mortem examinations further abscesses, undiscovered at the operation, were found, so that it is possible that an even more complete search among the adhesions might have saved a

larger proportion of patients; in other words, the patient's life depends on the discovery and opening of all the abscesses. But perhaps the most surprising feature is that among 14 cases of diffuse peritonitis only 2 died; and by "diffuse peritonitis" the author explains that he means a condition in which there is absolutely no trace of encapsulation, the appendix lying free and often perforated, turbid fluid, frequently with fibrinous flakes and pus, throughout the abdomen, and the whole bowel red and distended—a state of affairs in which the surgeon is apt to give a hopeless prognosis. We seem, then, to be led to these conclusions regarding acute appendicitis: that adhesions surrounding abscesses can be freely broken down with impunity; that, when multiple abscesses exist, the tearing through of adhesions must be even more thorough, as a single unopened abscess may prove fatal; and that diffuse peritonitis is by no means equivalent to a death-warrant. The peritoneum appears, therefore, to possess some special power of resistance in acute appendicitis as compared with other perforations of the abdominal viscera—a fact to which Körte, Friedrich, Lockwood, Watson Cheyne, and others have called attention.

Can any explanation be given of this empirical induction? It can be explained by assuming the establishment in the peritoneum of some degree of either a true immunity or of what Pfeiffer calls a pseudo-immunity. It is well known that the introduction of bacteria or their toxins into the peritoneal cavity in quantities below that of the minimal lethal dose results in the formation by the peritoneum of an antitoxic or antibacterial protective substance, causing a considerable degree of subsequent immunity to the specific organism or toxin injected; this is true immunity. Pseudo-immunity or increase of the normal resistance of the peritoneum simply means that the injection of certain fluids—cultures of bacteria, urine, bouillon, serum from another individual, and the like—irritates the peritoneum, causes a leucocytic reaction, and thus renders it for a time less vulnerable to the attack of *any* micro-organism. In the early stages of an acute appendicitis, while the bacteria are gradually pushing their way out along the lymph channels from the mucous towards the serous coat of the appendix, it is probable that a stream of toxins pours out into the whole peritoneal cavity before the escape of any actual bacteria; irritation of the peritoneum and consequent reaction ensue, resulting either in an increased resistance on the part of the peritoneum to all bacteria, or in a degree of true immunity to the specific bacteria in the appendix. Pfeiffer and Wassermann have shown that in the case of the cholera vibrio such peritoneal immunity can occur in six or eight hours. Eventually the bacteria themselves escape from

the appendix, but into an abdominal cavity which has had time to protect itself by means of leucocytosis or the formation of antitoxins.

The objection may readily be raised that this peritoneal reaction is local, that it results only in a locally increased resistance showing itself in the formation of limiting adhesions, and that this is an excellent argument *against* breaking down those adhesions, and allowing the infection to spread beyond the area of local resistance. Moszkowicz, however, is of the opinion that the peritoneal reaction is not local but general. Indeed, he goes much further, denying that in the great majority of cases of peri-appendicular suppuration the inflammation is at first local, and may later extend and develop into multiple abscess formation or diffuse peritonitis. He believes, on the contrary, that, except in mild cases, the condition begins as a general diffusion of toxins through the whole peritoneal cavity, followed by a general or diffuse peritonitis. The peritoneum having acquired, in the manner already described, an increased resistance or immunity, is, as a rule, able by its reaction to overcome the infection, except in the neighbourhood of the appendix, from which an invading army of bacteria is constantly issuing. The peritonitis, at first diffuse, thus becomes circumscribed, abscesses being formed wherever the organisms are specially numerous or virulent, in most cases around the appendix. The general peritoneal surface, however, retains for a time its power of increased resistance; hence the greatly lessened risk of causing dissemination of infection by breaking down adhesions, provided the chief foci of infection—the abscesses and the appendix—are radically dealt with. In support of the view that a diffuse peritonitis is generally the initial stage, there are many lines of evidence, both pathological and clinical. Not infrequently, for example, at an operation or at a post-mortem examination, in conjunction with a localised abscess in the region of the cæcum there are found bands and adhesions throughout the abdominal cavity—evidence of a previously existing diffuse peritonitis. Clinically, in many cases there exist at first all the symptoms of general peritonitis—diffuse pain and tenderness, immobility of the whole abdomen, meteorism, vomiting, non-passage of fæces and flatus. In three or four days these symptoms diminish, the general condition of the patient improves, and at the same time a localised swelling develops in the region of the cæcum. This second stage would correspond to the victory of the abnormally resistant peritoneum over the bacteria except at the source of infection. The fulminating cases of appendicitis, which cause a rapidly fatal general peritonitis, are those in which the bacteria have followed the toxins so quickly that the peritoneum has not had time to undergo its protective reaction.

The practical outcome is that in every case of abscess or general peritonitis due to appendicitis the appendix should be removed and abscesses sought for and completely evacuated, even though this may involve the breaking down of adhesions and the free opening of the general peritoneal cavity. The arguments in support of this procedure are:—

1. There is practically no additional risk in opening the general peritoneal cavity, provided appendix and abscesses are thoroughly dealt with.

2. No recurrence of appendicitis is possible. In abscess cases where the appendix has not been removed, recurrence occurs, according to Lockwood, in about 15 per cent. of the patients.

3. Multiple abscesses are all evacuated; it is just where this has not been done that a fatal result is apt to ensue.

4. The foci from which the bacteria spread are removed, and the peritoneum is able to deal with the organisms that remain.

5. Fæcal fistula is extremely rare.

6. Adhesions of bowel and subsequent intestinal obstruction are less liable to occur where the suppurative process is rapidly brought to a conclusion.

GYNÆCOLOGY

By J. W. BALLANTYNE, M.D., F.R.C.P.,

Lecturer on Midwifery and Diseases of Women, Surgeons' Hall and Medical College for Women, Edinburgh

TUMOURS OF THE OVARIES

THERE is no finality in matters gynæcological any more than in any other department of medicine or science. Even such a well investigated subject as ovarian tumours and diseases yields unexpected and important results to the clinician and pathologist; nay, more, the normal histology of the ovary, and more particularly of the corpus luteum in the ovary, is at the present time exciting much controversy and is suggesting new theories of the physiology of menstruation which may turn out to be revolutionary.

Dermoids.—It might, for instance, be supposed that little that is novel remains to be recorded regarding the effect of dermoid cysts of the ovary on pregnancy, labour, and menstruation; but Professor Condamin's observations (*Ann. de Gynéc. et d'Obstét.*, 2 S., I. 188,

1904) proves that this is not so. His patient was 36 years of age and was admitted to hospital suffering from pains in the lower part of the abdomen. Her menstruation had been quite regular till two years past, when she began to suffer from menorrhagia and some dysmenorrhœa. She had had five pregnancies, all ending in normal full term labours, but the last one had been accompanied by some peritonitis in the puerperium. Since then the patient had had occasional sharp attacks of pain in the lower part of the abdomen, especially at the right side and in the lumbar region; latterly there had been vomiting. Examination showed a uterus slightly displaced to the left, and a rounded tumour, the size of the fist, slightly rounded and with little mobility on the right side. It was painful on pressure, and was diagnosed as an intraligamentary cyst or an ovarian cyst whose pedicle had got twisted and had become adherent to surrounding parts. She at first refused operation, but returned three months later, when it was found that the tumour on the right side was about the same size but more mobile, while on the left side of the uterus another mass was felt supposed to be a lobe of the cyst on the right. Abdominal section was performed, and two cysts were discovered, one on the right and the other on the left, the former being the larger. That on the right side was really a cyst of the *left* ovary with a twisted pedicle long enough to permit of its migration; that on the left side was a cyst of the *right* ovary, also with a long and twisted pedicle. Both were unilocular dermoid cysts, showing no trace of ovarian substance on the surface; the right one had contracted some adhesions to the intestine and omentum. They were easily removed and the patient made a good recovery. The crossed arrangement of the cysts was one of the interesting features of the case. Another remarkable fact was the normal character of the menstruation from the menarché up to the age of 34 with bilateral dermoid cysts of the ovaries; and yet another was the occurrence of four uncomplicated labours, one of them being quite recent. This case, taken in conjunction with the 97 cases collected by Loewy and Guéniot in 1902, would seem to show that dermoid cysts stimulate the normal functions of the ovaries. In the removal of such cysts, especially in women below the age of 40, it will be wise to try to leave a fragment of ovarian substance with the Fallopian tube to permit of a new pregnancy, as was successfully done by Schroeder and Terrier.

J. Wesley Bovée (*Amer. Journ. Obstet.*, xlix. 280, 1904) also reports a case of ovarian dermoid with a twisted pedicle illustrating some of these characters. The patient was 47 years of age and had nine children. She had had two miscarriages

since the birth of her last child (five years ago). Menstruation had recently become scanty and the patient thought she was at the change of life. The last period was very painful; she suffered with "misery in the bottom of the stomach" for a week. Examination revealed a mass thought to be the uterus and a tumour extending to about 4 inches above the pubes, soft and irregular in shape. Abdominal section revealed the uterus, small in size, and normal appendages on the right side; on the left the ovary and tube formed a blackened, soft, globular mass, filling the pelvis and reaching to the umbilicus. The mass was adherent on all sides to the bladder, uterus, intestinal loops, omentum, and peritoneum, and had no free surface. The pedicle, consisting of the ovarian ligament and Fallopian tube, showed two twists. The tumour and the appendix vermiformis were removed by the electro-thermic angiotribe, and recovery followed. The tumour consisted of a dermoid ovarian cyst with hæmatosalpinx. In this case the twisting of the pedicle had probably occurred gradually. Dr Bovée conjoins with the above report that of another case of twisted pedicle. It was that of a large ovarian hæmatoma in a woman 36 years of age, who had had three normal labours and regular, painless menstruation. She had been attacked suddenly in the middle of the night with severe pain in the right iliac region which lasted for a week. She was told by her doctor that she had a tumour and she came to Dr Bovée for operation. A mass was felt in the lower portion of the right side of the abdomen, reaching to within two inches of the umbilicus and slightly fluctuating. Abdominal section was performed and the mass found to be a large ovarian hæmatoma, adherent on every side. It was the right ovary twisted about one and a half revolutions upon its pedicle, and was found later to be an old blood cyst with necrotic walls. The left ovary was three times the normal size, and contained numerous cysts and abscesses into which hæmorrhage had occurred; it was firmly adherent in the pouch of Douglas. Both appendages were removed, the round ligaments were attached to the upper portion of the posterior surface of the uterus, and the appendix vermiformis (thickened, adherent, and deeply injected) was also taken away. Downe's electro-thermic angiotribe was again employed, and the patient made a good recovery. At a meeting of the New York Obstetrical Society in February 1904 (*Amer. Journ. Obstet.*, xlix. 675, 1904), Dr J. Riddle Goffe showed a tumour of the broad ligament, consisting of two distinct portions; one cavity was full of blood and was evidently produced by a hæmorrhage into the broad ligament; the other had a distinct sac-wall, and upon inverting it was seen to contain a peculiar growth, as well as emulsified fat and a coil of hair. The peculiar

growth was 6 inches in length, seemed like a monstrosity without a head and with the lower limbs fused into one. Dr James Tuttle, who had operated upon the tumour, removing it through the posterior vaginal fornix, stated that the patient, a young girl, had complained of pain when the bowels moved; a tumour was felt in the left inguinal region almost occluding the rectum; her temperature was 101° and her pulse rapid. An incision was made through the posterior fornix and the blood cyst was first removed; then the second tumour, a dermoid with creamy contents, was brought down, adhesions surrounding it were separated, and it also was taken away. Some gauze packing was put in for a few days and the patient made a good recovery. Yet another case of dermoid ovarian cyst with twisted pedicle has been reported by A. Karczewski (*Zentralbl. f. Gynäk.*, xxviii., 547, 1904). It occurred in a girl, 10 years of age, and led to symptoms of volvulus of the sigmoid flexure; this led to the opening of the abdomen and the removal of the tumour.

Corpora Lutea Cysts.—Another subject in the sphere of ovarian pathology has recently been exciting considerable interest. I refer to the relation between ovarian cysts and hydatid mole, and through it with chorion-epithelioma. Marchand, Fraenkel, Jaffé (*Arch. f. Gynäk.*, lxx. 462, 1903), and Patellani Rosa (*Annali di ostet. e ginec.*, xxvi. 380, 1904), have all added to our knowledge of this relationship. It has been established that in many cases of hydatid mole there exist polycystic tumours of the ovary, generally bilateral, which have special characters and which consist of cystic degeneration of the corpora lutea ("false" and "true"), and sometimes also of the Graafian follicles. In connection with them there may be a dissemination of lutein cells through the ovaries; this dissemination is not restricted to hydatid mole pregnancy, neither are the corpora lutea ovarian cysts peculiar to it, for they may be found in the non-pregnant. Jaffé, however, believes that the over-production of lutein cells is the important fact, and that it leads to an abnormal action of the trophoblast of the fertilised ovum with degeneration of the chorion, and the formation of a hydatid mole. If this be so, then chorion-epithelioma also may be related to lutein over-production.

In the valuable paper of Patellani Rosa there have been gathered together the records of twenty cases in which, at the post-mortem, changes in the ovaries were found in women who had had hydatid moles; of twenty-nine cases in which operative interference was undertaken for ovarian disease in women who had previously had hydatid moles; and of seventeen cases in which ovarian alterations were noted in women who developed

chorion-epithelioma after an abortion or a labour. In the forty-nine cases belonging to the first two groups, there are thirty-seven instances of ovarian alterations associated with hydatid mole, and twelve in which they were associated with both hydatid mole and chorion-epithelioma. It can hardly be thought, in face of these facts, that there is no relationship between the corpora lutea, cystic tumours in the ovaries, hydatid mole, and chorion-epithelioma; but what that relationship exactly is has not yet been established. Meanwhile, at the December meeting of the London Obstetrical Society, Malcolm and Hamilton Bell made a communication regarding a patient who had had a hydatid mole, bilateral cystic disease of the ovaries, and invasion of the muscular wall of the uterus by chorion-epithelioma, and who now, two years after the removal of the parts, was quite well. One of the ovaries had a twisted pedicle. In the pathological report on the specimens, Dr Cuthbert Lockyer stated that he could not yet say whether the cysts in the ovaries arose from corpora lutea or not (*Journ. Obstet. Gynæc. Brit. Empire*, iv. 521, Dec. 1903). The ovarian growths were multilocular, the individual cysts were not large, and their walls were very thin; most of them contained clear fluid.

Rare Ovarian Neoplasms.—Glockner (*Zentralbl. f. Gynäk.*, xxviii. 701, May 28, 1904), reports the case of a woman, pregnant five months, and suffering from an ovarian tumour with parts of stony hardness. She was 29 years of age. The abdomen was opened, when it was found that lying near the uterus was the tumour, which contained a cyst the size of an infant's head with clear fluid contents, in which yellow fibrinous membranes were floating. The outer parts of the tumour were calcified. The patient made a good recovery, and came to the full term with a living child. The tumour was regarded as a cystic fibroma of the ovary, partly calcified. Glockner also describes a very large solid adenoma of the ovary in a patient 47 years of age. There was some ascites. After removal it was found that the tumour was almost solid, only in a few places were there small cysts with thick, viscid contents. Under the microscope it was seen to be made up of gland-like tubules with very slightly developed connective tissue stroma; there was not that tendency to cyst formation which is usually met with; and, on this account, the tumour was a pure *adenoma*. Glockner could find no exactly similar case recorded in literature. The tumour was to be regarded as innocent, for now, nine years after the operation,

the patient was well. Yet another interesting and rare case of ovarian tumour is dealt with by Glockner. It was removed along with the uterus (by vaginal hysterectomy) from a girl, 20 years of age, who came into hospital with high fever and severe septic manifestations. She had an abdominal tumour and some consolidation of the base of the right lung, and the diagnosis of pneumonia and ovarian cyst with sepsis was made. The patient lived a year and ten months after the operation, and died in a cachectic state. The tumour which affected the right ovary was soft in consistence, and, microscopically, consisted of solid epithelial masses and processes disposed in alveoli in a stroma of somewhat rich fibrillary connective tissue. In this stroma were numerous well-defined masses of small cells which showed chiefly in the centre distinct caseation as in giant cells. In other places the stroma gave the picture of diffuse tubercular granulation tissue with caseation and giant cells. The left ovary was not affected in the half lying towards the middle line, but at its outer pole there were numerous tubercular foci with caseation and giant cells. The peritoneum, so far as could be ascertained at the operation, was free from tubercle, but the pulmonary condition was regarded as tubercular and doubtless as the primary position of the infection. *Tuberculosis in the ovary* associated with an ovarian cyst is very rare; there have been thirteen cases, in eleven of which it was an ordinary cyst, and in two a dermoid; but in the present case the association was between a solid ovarian tumour (a carcinoma) and tuberculosis, a unique occurrence. The absence of peritoneal involvement was noteworthy. Glockner regards the pulmonary tuberculosis as the primary source from which, by the blood stream, both the ovaries became infected.

Enchondroma is another rare neoplasm of this ovary, but Jung (*Zentralbl. f. Gynäk.*, xxviii. 668, 1904) has recently put an instance of it on record. The patient was operated upon for a myoma of the uterus; vaginal extirpation was performed, and part of the right ovary was intentionally left behind. The age of the woman was 48, she was a vii-para, and she had suffered from irregular menstruation for six years, and lately from metrorrhagia. She died five months later from recurrence of tumour in the ovary. In the part of the ovary removed at the first operation, hyaline cartilage was found in richly cellular connective tissue; there were also clearly sarcomatous parts, and areas of the nature of an endothelioma. Whatever the tumour was, enchondroma or teratoma, it was evidently intensely malignant.

Editorial Notes and News

The Journal.

THE Editors regret the delay in this issue of the *Journal*, which is due to accidents outside their control.

The International Home Relief Congress.

THE International Home Relief Congress (*Assistance Familiale*) for the discussion of those methods "by which help can best be given to our weaker and less fortunate brethren without relegating them to special institutions where recipients of relief are congregated together," held its fourth annual gathering in Edinburgh on June 7th to June 10th. The work of the Congress was divided into five sections, dealing respectively with children, old age, able-bodied adults, sick adults, and insane and epileptic. A large number of visitors, including many distinguished foreigners, attended the meetings, and the papers and discussions at the various sections were very interesting as showing from what various points of view such subjects as old age pensions, the feeding of school children, or the treatment of the sick poor might be considered, and how many side issues frequently complicate the question under consideration.

The Congress was fortunate in securing as its president Lord Balfour of Burleigh, whose inaugural address dealt briefly, but most suggestively, with most of the subjects which were to come up for discussion. Amongst these was the method of poor relief in vogue in Scotland, and his lordship drew a most interesting contrast between the system adopted in England and in Scotland respectively, and showed that in Scotland we have never had to discuss the question of pauperism as a great national question. The system of boarding out poor children in families instead of relegating them to institutions was also discussed, and figures supplied by Mr Ferrier were quoted to show that of the 4563 adult poor chargeable to Edinburgh in March last, only 5 were known to have been previously chargeable as boarded-out children.

One subject which Lord Balfour referred to, the treatment of the sick poor, deserves further notice, but in the meantime we can only quote a few of his remarks. "The question of the treatment of the sick poor," he said, "is a most important one, and is well worthy of the serious attention of those who are here assembled. It has recently been made the subject of a most exhaustive and useful inquiry by a committee of the Local Government Board under Mr Patten Macdougall, one of the members, but I cannot go at length into the conclusions at which they have arrived. I only venture to say that I regard

the tendency in this country, which is, I am afraid, a growing tendency, to put the whole treatment of sick poor on an eleemosynary basis, as both impracticable and mischievous. Do I go too far when I say that the whole practice of our hospitals, infirmaries, provident dispensaries, friendly societies, insurance, and even the work of the private medical practitioner amongst the humbler classes of our population is in a hopeless state of disorganisation? Is it too much to hope that the treatment given by hospitals, if properly organised, could be made supplementary to the treatment of the sick poor by their own friendly society doctor or their own medical adviser, who, inasmuch as he knows the home and habits of his patient, is better qualified to advise than the overworked medical attendant in the out-patient department of a great hospital. If a second opinion, or it may be an operation, is required, the privilege of obtaining this might be put at the disposal of the friendly society or the club, and those who are deserving might be referred to the hospital, or in the last resort to the Poor Law authorities. Everything should be done to encourage the head of the family to become a subscriber of some form of medical insurance. I urge the discussion of whether some such division of work might not be made. I dread the direction in which we are tending, and I believe our hospitals can never obtain money enough to meet the growing demand which the present policy seems to invite."

The Royal Commission on Tuberculosis.

WHEN Professor Koch, speaking in London in 1901, delivered himself of the opinion that human and bovine tuberculosis were two specifically distinct diseases, and that tuberculosis was not transmissible from the cow to the human subject, his dictum was received with surprise, amounting in some quarters almost to stupefaction. For all over the country, and indeed all over the civilised world, the authorities were framing drastic measures for the protection of the public against the danger of consuming tuberculous milk or tuberculous meat. Such regulations, having the support of medical opinion, were favoured also by the public. Yet it appeared that one whom popular opinion at least regarded as the highest authority on tuberculosis was ready to stake his reputation that such precautions were needless. Professor Koch's opinion was received with considerable dubiety by those best able to judge, but it was quite sufficient to weaken the hands of those who were trying to bring about costly reforms in the way of the examination of cattle, the application of the tuberculin test, and other measures designed to protect the public from infection through their food.

The Royal Commission on Tuberculosis, appointed in 1901, has just issued an interim report upon the results so far obtained. These results, based upon a long series of experiments, controvert Professor Koch's opinion. The first line of inquiry taken up by the Commissioners was to discover the effects produced by introducing into the body of the bovine animal, either through the food or by subcutaneous or other injection, tubercular material of human origin. More than twenty different "strains" of tubercle were made use of. That is to say, material containing living tubercle bacilli from more than twenty cases of tubercular disease in human beings (from sputum, from tubercular glands, from phthisical lungs, from joints, etc.) was introduced into animals. In seven of these cases acute tuberculosis occurred immediately, with widespread disease throughout the body. In the other cases the animal was affected to a less extent, the tubercle either remaining local or spreading to a variable extent from the seat of inoculation. The results obtained in this way were compared with the results of injecting animals with tubercular material of bovine origin. The Commissioners report that the results are identical in the two cases. They failed to discover any character by which it is possible to distinguish tuberculosis of bovine origin from that due to infection by tubercular material of human origin. In carrying out their experiments the Commissioners made use of more than two hundred bovine animals, and their work was greatly facilitated by the generosity of Sir James Blyth, who placed unreservedly at their disposal his farm buildings and other accommodation at Stanstead. The Commissioners state that they have thought it their duty to issue this short interim report "for the reason that the results at which we have arrived—namely, that tubercle of human origin can give rise in the bovine animal to tuberculosis identical with ordinary bovine tuberculosis, seems to show to us quite clearly that it would be most unwise to frame or modify legislative measures in accordance with the view that human and bovine tubercle bacilli are specifically different from each other, and that the disease caused by the one is a wholly different thing from the disease caused by the other."

The Commissioners are Sir Michael Foster, K.C.B. (Chairman), Professor Sims Woodhead, Professor Sidney Martin, Professor J. M'Fadyean, and Professor Rupert Boyce.

Conscription and National Physique.

FROM the point of view of physical fitness, much might be said in favour of a law to render compulsory on the youth of this realm a definite amount of systematic exercise in the open air.

Physical drill in some form or another is evidently for the future to form an essential part of the school curriculum, and it is to be hoped that along with the drill there will be built up in the minds of the children an ideal standard of physical excellence, and a recognition that physical fitness no less than mental attainment has a moral claim on the individual. But if such training is to be of permanent value, from the point of view of national physique, the habit of systematic exercise must not be allowed to drop on leaving school. Under the more or less depressing influence of town life, young people of both sexes are only too apt, when their school days are over, to neglect the duty, and to fail to recognise the pleasures of regular out-door exercise. The young man of studious habits will seek his recreation in his books, and crowds of those to whom books appeal not are only too ready to find their pleasure in watching others engage in sport. After all, these latter doubtless derive some vicarious benefit from the vigorous exercise on which they are intent, for do not the psychologists tell us that the thought of a movement is just one step from the performance of it. But *personal* obedience to the laws of health is, after all, what is required of each of us, and in spite of all that the bicycle and golf have done for us, there remain multitudes of town dwellers whose health and physique would undoubtedly be greatly benefited if they had a few weeks in camp every summer and a number of drills of some sort to put in during the winter.

Such an assertion falls short by a long way of being a plea for conscription. We notice in some non-military organs a tendency to support the suggestion of the Report of the Royal Commission on the Militia and Volunteers that an element of compulsion should be introduced into our military system, on the ground that if these suggestions are carried into effect they will bring about, or help to bring about, a very desirable improvement in the physique of our young men. Whether conscription is necessary and desirable or not we have no intention of discussing here. But it should be kept in view that the question of conscription and the question of improving the physique of the nation are two quite different questions, having totally distinct ends in view. The aim of conscription is to improve the military position of this country among the nations of Europe, and if once introduced it cannot logically stop short of endeavouring to make every conscript an efficient soldier, however long and however arduous the training necessary therefor may be. Moreover, from the point of view of military efficiency the conscript net must be cast in such a way as to secure for the army or the home defence forces men of good

physique, while those of poor physique, as well as those in indifferent health, will escape. On the other hand, the latter are just the very people whom any scheme of physical amelioration by means of systematic exercise must keep in view. It is very necessary that the distinction between these two questions should be borne in mind. Such is the dread of conscription or anything approaching it in this country that many very worthy people strongly oppose even such organisations as the Boys' Brigade and the cadet corps which exist in some of our public schools, on the ground that these develop the military spirit and foster a public opinion favourable to conscription. So far as we have any evidence on the question, there seems to be little ground for such fears. The aim of cadet corps and similar bodies is, and should be, to produce an efficient citizen, not a soldier, and those who have had most experience of school cadet corps assure us that the military drill undergone by the boys has no special tendency to make the boys fall in love with a soldier's life, while on the other hand the strictness of discipline and the training in attention and in promptness to obey a word of command connected with military drill afford advantages which cannot be so perfectly obtained from any other form of exercise. We are therefore in entire sympathy with the efforts now being made to increase the time at school devoted to physical and to military drill, and approve of the formation of school cadet corps for the older boys. But there still remains the question of how the still growing youths who have left school may be induced to continue to secure the benefits which accrue from systematic healthy exercise. The conscription proposals of the Royal Commission scarcely help us towards an answer to this question.

The General Medical Council.

THE papers presented by Dr Macalister to the General Medical Council showing the results of the Service examinations, seem to show Scotland in a very unsatisfactory light, for the English Colleges show a much larger percentage of passes. But there is a good deal of reading to be done between the lines, and we do not think too much importance need be attached to this competition. If any Scotsman feels humbled over the figures, we would recommend him to make out a list of the University chairs filled during the same period, when he will have his national respect restored.

The report of the Committee on Preliminary Scientific Education is in itself interesting, and the discussion on it was even more so. Principal Mackay's suggestion for instruction in Biology without examination is not so foolish a one as some people seem to have thought it. In a school like

Dundee we believe instruction without examination is quite practicable, but it would be a different story in the larger schools, where one cannot have the same intimate knowledge of one's students.

Vested interests are powerful, but it is becoming obvious that before very long we may expect some real reform in the medical curriculum. We hear rumours of alterations in the Scottish Universities which we are not disposed to look upon as reforms. Change is not necessarily reform, and we would rather wait a while for the real article than jeopardise it by a makeshift.

We confess we do not agree with those who object to the new fee of £1 for students' registration. The General Medical Council is fast drifting into bankruptcy, and if each of the new Universities is to have a member of the Council, it will soon arrive there. So that obviously some new source of income had to be sought for, and compulsory registration seems to have appealed to the Council as the best.

We read with great pleasure Sir William Turner's weighty remarks in closing the discussion, and it must have been a gratification to him to find the Council so overwhelmingly in favour of his views. His neat allusion to the displaying of charters in arguments would be very much appreciated, and his reminder that the Medical profession had not been standing still since those ancient charters were given, should be taken to heart by those in command of the English Colleges.

New Books and New Editions

County of Dumbarton. Annual Report of the Medical Officer of Health for 1903.

THIS thirteenth annual report by Dr M'Vail chronicles the small incidence of infectious disease during the year under review. The general death-rate, though not quite so low as that of 1902, is still below the average. The form of the report differs somewhat from those of previous years owing to the new instructions of the Local Government Board for such reports. The meteorological data are continued, and show that the rainfall in 1903 was exceptionally heavy. At Dumbarton rain fell on 236 days in the year, and on one day in February 2.08 inches of rainfall were registered. Owing to the water of Loch Lomond at Balloch Pier being no longer suitable as a water supply, the Vale of Leven district is about to apply for a Pro-

visional Order to obtain a fresh water supply from Glen Finlas. Dr M'Vail approves of the gathering ground and reports that the water obtainable is excellent, whether judged by bacterial or chemical tests. The Glasgow manure traffic at Bearsden has given rise to a nuisance, which the medical officer hopes to abate by arrangement as to the quality of refuse sent to this district. The pollution of the River Leven by factory effluents was investigated and the effluents were analysed in considerable number. The result was to show that the pollution is less than formerly, and to enable the medical officer to make suggestions for further improvement. The respective responsibilities of the Local Authority and of the Parish Council in certain cases of illness amongst paupers were defined by the Local Government Board on a reference by the Local Authority and a report by Dr M'Vail. The decision may prove useful in future cases. The report concludes with tables showing the birth and death rates in each district of the county.

County Council of Stirling. Report of the Medical Officer of Health for 1903.

DR M'VAIL records that the year 1903 has been characterised by freedom from infectious disease and by a low death-rate from all causes. That this happy condition of health in the county was not wholly due to meteorological conditions is proved by the fact that while 1903 was an extremely wet year, a similar report was made as to 1902, which was, on the contrary, a dry year. Under Dr M'Vail's careful supervision it is probable that improved sanitation in the county has helped to maintain a low death-rate even under such opposite conditions as these two years have imposed. While following the Revised Instructions of the Local Government Board as to the form of his Annual Report, Dr M'Vail has continued the meteorological information which is not specifically mentioned in the instructions, but which has distinct uses in connection with Public Health, and has been for many years observed and recorded in Stirlingshire. In other respects the report covers all the varying duties of a medical officer of health, and special attention is called to the improvement of defective house accommodation in country districts. It is suggested that the cost of scavenging villages is insufficiently provided for owing to the limitation of assessment permissible for this object. The growing value of bacteriological examinations as a help to administration is recognised, and Stirling County Council should consider whether it might not be profitable to unite with other County Councils

in maintaining in a central situation a laboratory for the purpose. The tabular statements of vital statistics are as full as usual, and the volume contains special reports as to the burghs of Grangemouth and Bridge of Allan. The former will be more sanitary when the new water supply from the Bannock Burn is introduced. The latter is a healthy place, the only defect being the condition of its dairy premises, and more especially of the byres. This is receiving the attention of the medical officer.

County of Clackmannan. Report of the Medical Officer of Health for 1903.

THIS thirteenth annual report shows that the population of the county is decreasing, owing to diminution in the towns of Alva, Dollar and Tillicoultry. The sanitary state of the county is good, but the water supply of Clackmannan is defective, mainly for want of efficient filtration. The present filters are overworked and incapable of giving a sufficient supply of thoroughly filtered water. Dr Nasmyth recommends the provision of additional filters in order to render the water suitable for domestic use, but so far no action has been taken to remedy the defect. Attention is also called anew to the foul condition of the river Devon. There was no serious infectious epidemic during the year. The burghs of Alloa, Alva, Dollar and Tillicoultry are reported upon separately. Alloa is in good sanitary condition, but is deficient in modern working-class houses. Alva shows rather a high death-rate from phthisis and tubercular diseases, while Dollar is a healthy town with little need for criticism except in the matter of its dairy accommodation and management. Tillicoultry requires better storage for its water supply, and the introduction of a proper system of drainage. Its sewage should be purified before discharge into the Devon. The report includes several tables, giving in detail the statistics of births and deaths, and of the numerous enquiries which are the province of a Medical Officer of Health.

County of Fife. Report of the Medical Officer of Health for 1903.

THE thirteenth annual report of the Medical Officer of Health shows that last year there were more cases of infectious disease in Fife than in the previous year. This was entirely due to an outbreak of enteric fever at Lochore, spread by the use of a polluted water supply. Dr Nasmyth has this year drafted his report according to the new regulations issued by the Local Government Board, and his account of each of the four districts

—Cupar, Dunfermline, Kirkcaldy and St Andrews—is similarly set forth. The analysis of water in the County Laboratory shows that in many cases the water supply in Fife is unsatisfactory; out of forty-eight samples examined, as many as twenty-eight were certified as unfit for domestic purposes. The possible occurrence of ankylostomiasis in Fife mines is foreseen, and a wise warning is given as to necessary precautions for the prevention of its introduction to Fife, as it has already invaded Cornwall. A good description, illustrated by a diagram, is given of the enteric fever epidemics at Lochore and Mary Row. It shows the importance of patient tracing of all possible sources of pollution in the case of water-borne enteric fever. The investigation was duly aided by bacteriological tests, and demonstrated more than one possible source of pollution. The report contains numerous tables, showing the vital statistics of each district and the work done during the year by the sanitary officials.

Kinross-shire. Report of the Medical Officer of Health for 1903.

THE eighth annual report by Dr Nasmyth on the health of the county of Kinross states that the water supply throughout the county is on the whole good. With regard to other matters defects are pointed out, more especially the defective scavenging of Milnathort, the overcrowded state of Cleish churchyard, and the need of bye-laws as to the building or rebuilding of houses. It is satisfactory to find that some effort is being made to prevent the discharge of unpurified sewage from Kinross into Loch Leven. The report is drafted in accordance with the new regulations of the Local Government Board, and includes tabular records of the vital statistics of the county.

Ophthalmological Anatomy with Illustrative Cases. By J. HERBERT FISHER, M.B., F.R.C.S. Pp. 188. London: Hodder & Stoughton. 1904. Price 7s. 6d.

THE author's object in writing this volume is to supply the ophthalmic surgeon with a clear anatomical picture of the parts his specialty touches on.

The work is divided into two parts. Part I. deals with ophthalmological anatomy, while Part II. is devoted to a detailed account of twenty-three illustrative cases. In Chapters I. and II. we have a clear and lucid account of the visual pathways and centres, and of the centres for ocular movements. The cranial nerves, their nuclei, origin, course and distribution,

and the cervical sympathetic and lenticular ganglion are found fully described in Chapters III. and IV., while Chapter V. is devoted to the cutaneous nerve area of the head and face, and to cerebral topography. In Chapter VI. the ocular muscles and their anomalies are discussed together with Tenon's capsule.

In a treatise such as this one would naturally expect to find the latest information regarding the structure and function of the check ligaments and their importance in operative procedure for strabismus discussed. The works of Motais and other recent writers are not referred to, and we find no reference to Müller's palpebral and orbital muscles, notwithstanding their great importance in Grave's disease, and in affections of the cervical sympathetic nerve.

We agree with the author regarding the absurdity of the old theory of the ball-and-socket movement of the eyeball in Tenon's space, and also with the statement that all movements of eyeball, even the most simple, are the result of the combined action of every extra ocular muscle.

The author's most interesting paper on *Concomitant Strabiscus*, published some time ago in the *Royal London Ophthalmic Hospital Reports*, has been reproduced in its entirety, and is perhaps the best part of the book.

The anatomy of the eyelids, lachrymal apparatus, blood vessels, and venous sinuses, the orbit and surrounding air cells, and some points in development are discussed in the remaining chapters of the first part, but why stop short at giving only *some* points in development? We should have expected a full account of this important subject in a work on ophthalmological anatomy.

The cases in Part II. are interesting, but surely they are not needed, seeing that the book is written specially for ophthalmic surgeons. Is it the case that the author presumes that the modern oculist's knowledge is defective in more points than ophthalmological anatomy? Had he devoted more space to ophthalmological anatomy, and left the illustrative cases out of the book altogether, we venture to think that the author would more fully have attained the purpose he had in view in writing the book.

The printing and paper are excellent, but the illustrations are not so good nor so numerous as they should be. The only fault we have to find with the work is its incompleteness, for so far as it goes it is admirable, and must be of very great assistance to those for whom it is written.

A Manual of Ophthalmic Practice. By CHARLES HIGGINS, F.R.C.S. Second edition, revised and edited by ARTHUR W. ORMOND, F.R.C.S. Crown 8vo. Pp. viii. and 375. London: H. K. Lewis. 1903. Price 7s. 6d.

ACCORDING to the author's preface an endeavour has been made to bring this edition thoroughly up to date, but, in his endeavour to make the book attractive by making it as concise and simple as possible, he has overshot the mark. For example, few students can be satisfied with the bare statement that the ciliary muscle in Tscherning's theory of accommodation is said to compress the lens in some manner and so alter its curvature. Such an explanation might be suitable in a handbook for nurses or opticians, but it is scarcely suitable for students who have already taken full courses in physiological optics and physics. Again, myopia is said to be due to an elongation of the eyeball, and regular astigmatism to a want of symmetry of the cornea, but there are other causes which every student ought to know. The statement that the projection of the false image in diplopia is always in the opposite direction to that of the deviating eye is correct, but surely the reason why might be given. Bowman's layer is represented in fig. 38 as double the thickness of Dercemal's, the reverse being correct. Figs. 17 and 28 might well be improved, the nodal point, *e.g.*, is placed close to the centre of rotation; and fig. 39 does not give a correct idea of the circular portion of the normal ciliary muscle. What is represented is that found in high hypernectropia, where Müller's portion is hypertrophied. The speculum and canaliculum director figured are obsolete, so also is the method recommended for dividing the lower canaliculus. There is no mention of the operation of advancement in the treatment of convergent strabismus, and to say that it is advisable to neutralise hypermetropia after operating is misleading, for operative interference is never adopted till the use of spectacles and other measures have failed. That *many* cases of divergent strabismus can be remedied by the use of concave glasses is too optimistic, *very few* would be more correct. To keep the eye operated on for cataract bandaged for three weeks and the sound eye for one week, is more than our patients will tolerate.

The subject of refraction is inadequately treated. We thoroughly disagree with the author's graduated method of prescribing glasses. Atropine would secure accuracy and at the same time save time, trouble and expense. In dealing with extreme cases of myopia, the use of the dark room recommended might with benefit be abandoned, and deep neutral-tinted glasses and fresh air substituted, for the patient's general health in these

conditions must not be lost sight of. In prescribing glasses the proper centering of lenses has to be impressed on the student, yet there is no mention made of it, and heterophoria is conspicuous by its absence.

The vague and antiquated term *ophthalmia* is in favour, the more accurate term *conjunctivitis* occurring only once in the book, and the new silver salts, so valuable in the treatment of conjunctival affections, are not even referred to.

Ophthalmology, as taught at present in our medical schools, is far too extensive and important a subject to be dealt with at all adequately in a small volume such as this. We therefore trust that in a future issue this book will be considerably enlarged so that its sphere of usefulness may be extended.

Diseases of the Eye. By L. WEBSTER FOX, A.M., M.D., Professor of Ophthalmology in the Medico-Chirurgical College of Philadelphia. 5 coloured plates, 296 illustrations. London: Sydney Appleton; New York: D. Appleton & Co. 1904. Price 18s.

THE book opens with a short account of the development and anatomy of the eye. The anatomical descriptions, if simple, are often somewhat inaccurate and misleading. The various diseases of the eye are then treated of in regional order, commencing with the lids. In describing operative procedures for the relief of ptosis, Professor Fox alludes to no less than seventeen operations, leaving the reader quite in the dark as to which operation would be most suitable in a given case. His own operation seems essentially to consist in taking away a fold of skin. A very large number of methods of dealing with a pterygium are described, the development of operative procedure being traced since 1813, surely not a matter of great moment. The descriptions of keratitis seem very confused, and the drawings given (figs. 76 and 81) do not help to elucidate matters. Treatment of hypopyon ulcer with the cautery appears to be mentioned only as a remote possibility. Fig. 119, styled "retrobulbar neuritis," is surely a mistake. There is an interesting chapter on ocular affections in general diseases, and another on the pupil in health and disease. The chapter on cataract is disappointing. We do not fancy that many operators insist on a patient living on a purely vegetable dietary for some weeks before operation, nor do we fancy that many consider the special form of dressing used to be of more than very minor importance. The account of ametropia and refraction testing is very incomplete. Muscular deviations are described in some detail. The clinoscope of Dr Stevens is described and figured. The book closes with an appendix on

operative technique, a list of therapeutic formulæ, and a glossary containing many extraordinary words — amphiblestroiditis, iridoperiphakitis, etc.

A very large number of the illustrations are from standard text-books, and especially from Fuchs' well-known work.

We cannot recommend the book, as it seems far inferior to many other English and American books of about the same size and scope.

The Refraction of the Eye: a Manual for Students. By GUSTAVUS HARTRIDGE, F.R.C.S. Twelfth edition. London: J. & A. Churchill. 1903. Price 6s.

WE gladly welcome another new edition of this popular manual on the refraction of the eye. In the comparatively short space of nineteen years this book has passed through no fewer than twelve editions, sufficient proof of its usefulness and of its ever increasing popularity.

The important chapter on retinoscopy has been rewritten, and various alterations have been made throughout the book in accordance with our increasing knowledge of the subject. We notice that the use of mydriatics is favoured in the case of young people, and that the plane mirror has at last found the place of honour in retinoscopy. The ophthalmometer, an instrument used extensively all over the continent of Europe, and especially in America, does not find favour with the author, for he regards it as an instrument which may be of much value scientifically, but evidently not of much practical or clinical value. From an extensive experience we have come to regard the instrument as an indispensable adjunct in estimating refraction, especially in patients at the two extremes of life. In such cases a subjective examination, such as is afforded by optometers and such-like instruments, cannot be compared to the objective examination by the ophthalmometer. It is true that the latter instrument supplies us with the amount of corneal astigmatism only, and nothing more; but when accommodation is in abeyance, as in old people, or artificially paralysed in young people, it is surprising to note how seldom lenticular astigmatism is found, and how frequently, almost invariably, the total amount of astigmatism agrees with that estimated by the ophthalmometer.

Recently several new works of similar size and aim have been published both in this country and in America; and although some of these are formidable rivals to this well-known and standard work, still we think that Hartridge's manual will hold its own against all comers. The only alteration we should like to see made in the arrangement of the book in future

editions would be that more attention be given to optical details, whereby the value of the work would be greatly enhanced, for as at present we think it is somewhat elementary for the present-day student who has already passed in physics and physiological optics.

Text-Book of Diseases of the Eye. For Students and Practitioners of Medicine. By Drs HANSELL and SWEET, Philadelphia. Pp. 532. London: Rebman, Limited. 1903. Price 17s. net.

AT the present time there is no scarcity of text-books on diseases of the eye specially written for the use of students and practitioners, and yet another, the conjoint work of two American authors, has recently been published. Most of those already in circulation are of a very high standard and treat the subject admirably both from the student's point of view and from the teacher's. It is therefore difficult to justify the existence of this newcomer and to see what special function it is expected to perform.

The subject matter throughout the book is tersely, practically, and fairly comprehensively presented to the student of ophthalmology, the only fault we have to find is an undue preference for the views of American authors. This is very noticeable in the chapter on lachrymal affections, where the writer finds it necessary to quote only from his own writings.

Chapter xviii., devoted to ocular symptoms in general disease and ocular headaches, is particularly well written, and there are one or two specially contributed articles in the appendix which will be found useful.

The volume as a whole is handsomely got up, the printing, paper and illustrations leaving nothing to be desired. It can safely be recommended as a reliable and thoroughly up to date text-book.

Elementary Lectures on Errors of Refraction and their Correction. By HAROLD B. GRIMSDALE, F.R.C.S. Eng. Pp. 87. London: The Medical Times, Ltd. 1904. Price 2s. 6d.

THIS little book, consisting of six chapters, is the latest addition to the many works already published for the use of students on the refraction of the eye. The subject matter is presented in a clear and lucid manner, beginning with a description of the properties of light and lenses, physiological optics and retinos-

copy, and finishing with a short account of the different forms of ametropia and their treatment with illustrative cases. So far as it goes we have nothing but praise to offer, but it is not sufficiently comprehensive for students attending qualifying courses in ophthalmology for medical graduation. We are in full agreement with the author in his statements regarding the use of mydriatics, or, more correctly speaking, cycloplegics, in estimating all refractive errors in young people, and in ordering fully correcting glasses when possible, with the object of converting the ametropic into the emmetropic condition. A more extensive use of the ophthalmometer would, we venture to think, convince the author that lenticular astigmatism is not such a formidable condition as we are led to believe. We have found in most cases, after an extensive and systematic use of the instrument, that astigmatism is to a very large extent almost entirely confined to the cornea.

Due importance is given to the advisability of fully correcting glasses in all forms of so-called "occupation headaches," however slight the error may be, for experience shows how frequently ocular headaches are caused by trifling degrees of astigmatism and hypermetropia.

The illustrations are reproductions of blackboard sketches, and although by no means elegant, they serve their purpose. The printing and paper could with advantage be improved.

Atlas of External Diseases of the Eye, including a Brief Treatise on the Pathology and Treatment. By Professor HAAB, of Zurich. Authorised translation. Second edition. By Dr DE SCHWEINITZ, of Philadelphia. Pp. 232. Philadelphia: W. B. Saunders & Co. 1903.

THIS atlas of external diseases of the eye forms an admirable companion book to Professor Haab's atlas of ophthalmoscopy. It begins with an admirably written short treatise on examination of the eye in disease, in which the student will find the most recent methods of clinical examination lucidly described, thus preparing him by easy stages for the full appreciation of the letterpress, and for the easy recognition of the details of the ninety-eight excellently reproduced chromo-lithographic illustrations which comprise the greater part of the book. These illustrations, faithfully reproduced and life-like, represent the most important and most frequently met with ocular affections, while the letterpress accompanying each contains a short clinical history and description, together with a summary of the

most recent and well-known therapeutic measures known to ophthalmologists.

In this new edition the learned author has taken the opportunity of adding several new chromo-lithographic plates, and the translator has inserted within brackets in several instances his own views, so that the student has presented to him the most recent German and American views of the pathology and treatment of external diseases of the eye.

The work is in every way an excellent one, and we have the utmost confidence in heartily recommending it to students and practitioners.

A Handbook of Diseases of the Eye and their Treatment. By HENRY R. SWANZY, M.B., F.R.C.S. Eighth edition. Post 8vo, pp. xx. + 678, with illustrations. London: H. K. Lewis. 1903. Price 12s. 6d.

MR SWANZY'S excellent handbook needs no bellman to proclaim its merits. The rapidity with which successive editions are called for leaves little room for doubt that it has established its reputation as one of the most approved products in the British ophthalmic market. It has almost become a medical annual. Each new edition is as welcome as an old friend returned from a journey whose portmanteau reveals that he has parted with some things by the way only to make room for better.

The novelties on this occasion comprise articles on Conjunctivitis Petrificans, Grating-like Keratitis, Keratitis Aspergillina, and the Eye Symptoms in Myasthenia Gravis.

By judicious omissions of obsolete matter, space has been found for more detailed accounts of such important subjects as Sympathetic Ophthalmitis, Magnet Operations, Maxwell's Operation for Shrunken Socket, and Krönlein's method of reaching orbital tumours.

Mr Swanzy is to be congratulated on the thoroughness with which his work has been revised and brought up to date without materially increasing its size.

Social Diseases and Marriage: Social Prophylaxis. By PRINCE A. MORROW, A.M., M.D. Pp. 390. London: Sydney Appleton. 1904.

A BOOK entitled "Syphilis and Marriage," written by Fournier more than a quarter of a century ago, remains one of the classics in medical literature, but it only covers a part of the important subject to which Dr Morrow directs attention: Syphilis is believed by the laity, and perhaps also by the

majority of the profession, to be a much graver disease than gonorrhœa. Fournier did much to establish its importance in our social life by so vividly showing the part it plays in marriage to the wife, the mother, and the child. Insurance companies have also recognised its important bearing as an influence on life values. During the last decade, however, the dire effects of gonorrhœa have been more appreciated by medical men, and they now recognise that it is far from being the simple affection which it was formerly thought to be. Neisser discovered the coccus in 1879, and ever since then its importance as a causal factor of disease has been growing in the mind of the profession, until many now question whether—and Dr Morrow is one of those who believes—its effects upon social life may not be greater even than those of syphilis.

This book is divided into three parts—(1) Gonorrhœa and Marriage, (2) Syphilis and Marriage, (3) Social Prophylaxis. Each of these teems with suggestive facts, brought before the reader in a lucid and convincing manner; and although the subject can never be wholly separated from a certain degree of indelicacy, yet the author discusses it in the most delicate manner. Courage may be needed to write upon this subject, but the most prudish could find little to offend in this work. To appreciate the influence of gonorrhœa as a factor in social life, we have only to consider that the man who marries while suffering from an uncured gonorrhœa will almost certainly communicate the disease to his wife. The results of this infection embrace: (1) the individual risks to the health and life of the woman; (2) its effects upon her conceptional capacity in inducing sterility; (3) its effects upon the infant in the production of abortion, premature birth, ophthalmia neonatorum, blindness, etc.; (4) dangers to the entourage. When a woman is infected, where is the primary seat of infection? Is it uterine?

A difficulty constantly before the medical man arises, viz., when is the gonorrhœa cured? It is well known that cocci may lie dormant and be few in number, until some sexual excitement causes them to come to the surface of the urethra. Their detection is difficult, and to tell when a man is wholly free from them is practically impossible (*v.* page 150). Such are some of the problems the author discusses in the most dispassionate way; there is no hysterical writing, as so often seen in the writings of those who expiscate social problems. For prophylaxis the author advocates moral and educational training in sexual matters, as at present the most feasible means to do good. In this section of the work the author again writes in a temperate fashion.

In the opinion of the writer every medical man would do

well to procure this work, study it with the utmost care, and lend it to his clergyman. It deals in an instructive manner with a great social problem, which cannot, from its nature, be discussed publicly, and yet which is no less important to the community, indeed is probably more far-reaching in its effects, than tubercle or alcohol.

Organes Génito-Urinaires de l'homme. Par HENRI HARTMANN. Pp. 432; illustrations 412. Paris: Steinheil. 1904. Price 13s. 6d.

THE title of this book does not convey a true idea of its object and scope. It would have been better to entitle it "The Operative Surgery of the Genito-Urinary Tract," as the text and illustrations are entirely devoted, as stated in the preface, to indicate the therapeutic indications in genito-urinary surgery, and to explain the manner of remedying them. Normal and pathological anatomy are shortly described, but only so far as it is necessary to do so for comprehension of the methods of treatment.

Having written so much to elucidate the scope of this work, it only remains to state that the book fulfils its object in the most excellent manner. The text is simple and easily understood, while the illustrations, 412 in number, are exquisitely done. M. Hartmann has placed before the profession a thoroughly practical work, written with full appreciation of modern methods. It maintains the high reputation of the French school to which the author belongs, and is worthy of the highest praise.

Selected Papers on Operative and Clinical Surgery. By the late WILLIAM STOKES, M.D., M.Ch. (Univ. Dub.), F.R.C.S.I., Knt., Surgeon in ordinary to Her Majesty Queen Victoria in Ireland, etc. Edited by WILLIAM TAYLOR, B.A., M.B. (Univ. Dub.), F.R.C.S.I., Surgeon to and Lecturer on Clinical Surgery, Meath Hospital, and Co. Dublin Infirmary, etc. With a Memoir of the Author by ALEXANDER OGSTON, M.D., Regius Professor of Surgery, University of Aberdeen, Surgeon in Ordinary to the King in Scotland. Demy 8vo, pp. xxiv. and 484, 52 illustrations and 26 plates. London: Baillière, Tindall & Cox, 8 Henrietta Street, Covent Garden; and Dublin: 16 Lincoln Place. 1902. 10s. net.

THIS is a book which every student of Surgery will value highly—using the term student to indicate not so much those

who wish to pass an examination in the subject, as those who devote their best energies to it, and have made Surgery their life work.

The introductory memoir of Sir William Stokes is fittingly written by Professor Ogston, who tells us how the two studied together as young surgeons on the Continent in the early 'sixties, and remained firm friends for the rest of their lives.

The reprints include papers, thirty-four in number, on many widely different branches of Surgical practice, as well as addresses delivered to students and before Medical Societies and Congresses.

They are valuable as detailed studies and reviews of Surgical practice from the hand of a clear and able writer, and a thoughtful and truth loving man.

We regret that by an oversight this notice has been unduly delayed, but the book is not like a text-book, and will not soon grow old.

The Nutrition of the Infant. By RALPH VINCENT, M.D. Durh., M.R.C.P. Lond. Pp. 288. London: Baillière, Tindall & Cox. 1904.

DURING recent years the literature dealing with infant feeding has grown very rapidly, and many excellent treatises have been written. Dr Vincent, in his endeavour to make his practice as exact and scientific as possible, was for a time greatly discouraged by the many theoretical and practical difficulties surrounding the whole question. He aimed at a high ideal—of so perfecting "artificial feeding" that its results would be comparable with those of breast feeding. With this object in view Dr Vincent turned to the work of Dr Rotch of Boston, and in the percentage method devised by this authority, by means of which any desired milk mixture can be prescribed so as to contain the various constituents in any proportion required, he found it possible to obtain the most gratifying results to all concerned. The use of this method, he says, has converted the most unsatisfactory part of his practice into one of the most satisfactory and full of interest.

Improper methods of artificial feeding are undoubtedly accountable for much of the heavy infant mortality, and the matter is therefore one of urgent importance; but we cannot share Dr Vincent's enthusiasm regarding the system of percentage feeding, nor do we think that by its general adoption we should be much nearer the solution of this problem. Apart from the chapters dealing with Dr Rotch's methods and with infant feeding and development, which we think will appeal,

in the main, to the specialist, Dr Vincent has collected a great deal of information in the remaining portion of his book which we are sure will prove useful to the general practitioner. Here the nutritional disorders are discussed, and many practical hints are given which we have looked for in vain in most works of a similar nature. The book is well printed and the index is good.

The Care and Feeding of Children; a Catechism for the use of Mothers and Children's Nurses. By L. EMMETT HOLT, M.D. With an Introduction by Eric Pritchard, M.D. Third Edition. London: Sidney Appleton. Price 2s. net.

THIS little book is a masterly piece of work. Both the matter and manner of it are admirable, and we know of no catechism of the kind approaching it in value. Its straight questions and plain answers give just the details a high-class children's nurse ought to know; and there are very few young medical men who will not be wiser and better practitioners after studying its interesting pages.

We should like respectfully to suggest to Dr Holt that it would be a great advantage if something could be done in future English editions, by footnotes and otherwise, to adapt the book a little to the experience of British mothers and nurses. The constant references to precautions required by the peculiarities of the American climate are of course necessary for American readers; but they are perplexing to the unlearned in this country, and may lessen the force of the rest of the advice, which is equally applicable in all lands. Such terms, also, as crackers, zwieback, sprue, etc., might usefully be replaced by their English equivalents. We only refer to this matter, because it seems to us that its obtrusively American character will tend to prevent the very wide circulation here which Dr Holt's little book certainly deserves among the class for whom it is primarily intended.

Memoranda on Infectious Diseases for the Use of School Teachers. By JAMES W. ALLAN, M.B. Pp. 23. Bristol: John Wright & Co. London: Simpkin, Marshall & Co.

IN this pamphlet Dr Allan has endeavoured to call the attention of school teachers to signs and symptoms of infectious disease which they may meet in their daily work. Each infectious disease is described separately, and due emphasis is laid on the early symptoms which it may present. It is obvious that a

great deal in the way of prophylaxis might be done by careful teachers, and Dr Allan's booklet can hardly fail to be of great use to those who feel the responsibility which undoubtedly rests on them.

Ailments of Women and Girls. By FLORENCE STACPOOLE, Certificated London Obstetrical Society; Lecturer for the National Health Society, and for the Councils of Technical Education. Pp. 238. Bristol: John Wright & Co. 1904.

THERE is a vast amount of good advice contained within the boards of Miss Stacpoole's *Ailments of Women and Girls*. The authoress wisely says little about the anatomy of the genitals, but passes quickly into her subject in a chapter on menstruation, which is one of the best in the book. No medical man will differ from her when she says that in the care and for the comfort of a girl during the years when menstruation is being established, "an ounce of mother is worth a pound of doctor"; the sadness lies in the fact that so few mothers give their ounce of care to their daughters at this trying time in life. A great deal, but not too much, is said regarding the harmfulness of constipation, and the hot water enema is strongly recommended. In this relation, it is somewhat startling to be told that there are nurses who cannot give an ordinary enema; let us hope they will soon be as extinct as the dodo. "The real danger at the menopause" is rightly identified by Miss Stacpoole as drunkenness and the drug habit, and her words of warning may do good in saving some of her readers. The paragraphs on hysteria are very good: "just as some women take to gambling at 'Bridge' as a diversion to vary the tedium of existence, so others take to a mild form of ill health." We might quote many other useful and easily remembered sentences from this book, but from what have been given an idea of its general soundness may be gained. The classification of laxatives which is adopted is novel and curious, viz., laxatives from the grocer, from the greengrocer, from the butcher, from the baker, and from the chemist.

A Case-Book for Private Nursing. $7\frac{1}{2} \times 9\frac{1}{2}$ in. Pp. 48. Price 3d. Also, **The Examination of the Urine.** By J. K. WATSON, M.D. Edin. 32mo. Pp. 32. Price 1s. The Scientific Press.

THE Case-Book may be heartily recommended. It is of convenient size and so arranged that the medical attendant may readily ascertain the particulars of the day and night reports.

The booklet on Examination of Urine is intended for nurses. It would have been well had there been more definite instructions as to obtaining an uncontaminated specimen. Although there are a few inaccuracies, doubtless from inadvertence, and a few places in which there is a want of clearness of description, nurses should find this book a useful guide.

Uric Acid: An Epitome of the Subject. By ALEXANDER HAIG, M.A., M.D. OXON, F.R.C.P. 158 pages. London: J. & A. Churchill. 1904. Price 2s. 6d.

THE essential features of this book as delivered for review, and presumably as issued to the public, are three: (1) a terrifying list of morbid conditions; (2) a statement that all the diseases named in that list can be cured by adopting the author's dietary principles; and (3) a slip advertisement, announcing that at Apsley House, Slough, "patients are received for the purpose of practical instruction in the Uric Acid Free Diet, under the direction and supervision of the Author of the System."

Materia Medica, Pharmacology and Therapeutics: Inorganic Substances. By C. D. F. PHILLIPS, M.D., LL.D., F.R.S., F.R.C.S.E. Third Edition. London: Longmans, Green & Co. Price 21s.

IN his volume of some 900 pages, Dr C. D. F. Phillips gives to modern medical literature an addition of decided value, at once simple and clear in arrangement of subjects, elaborate in detail, interesting in style, and markedly practical in matter.

Throughout, the book shows manifold signs of unremitting care in the endeavour to offer to readers the fullest and latest details regarding the present-day knowledge of each and every substance mentioned.

For practical physicians, the work will be found teeming with valuable information and suggestion, derived largely from the author's wide experience, but also to be found in an exhaustive summary of the observations of a large number of other medical men. The number of these latter quotations throughout the book is very large, and it would certainly seem that some might with advantage have been omitted as being more of the nature of curiosities than of real and practical value. For like reasons, there is also evident a certain want of proportion in the amount of attention bestowed on really valuable subjects and that on quite subsidiary and secondary ones.

Despite this undoubted tendency to prolixity in parts, the

important and valuable points in the book are readily and easily made out, and the pleasure in its perusal is by no means diminished.

The section on baths, mineral waters, and spas is a leading feature of the work, and in addition to the excellent general index, there is a very complete special index of spas and waters.

The General Pathology of Inflammation, Infection and Fever. By E. W. AINLEY WALKER, M.A., M.D. OXON. Crown 8vo, pages xii. + 260. London: H. K. Lewis. Price 4s. 6d. net.

UNDER the above title Dr Walker has published a series of lectures delivered at Guy's Hospital under the Gordon Trust. We cordially welcome their publication, as some book of a handy size on this subject was badly needed both by students and practitioners of medicine. The subject is treated by Dr Walker in a wonderfully lucid manner, and in his hands the most difficult and complicated problems become comparatively simple. The first part of the work is devoted to the subject of Inflammation, which is very adequately discussed. The lectures on Infection and Immunity which follow are, however, the main feature of the book. The views of older writers are first mentioned and discussed, and the gradual evolution of the modern theories is then carefully traced. Full value is given to the work of both British and foreign observers, but the writer is exceedingly modest as regards his own work, of which one hears rather too little. The lectures on Bacteriolysis form quite the most readable account of the subject which we have had the good fortune to meet with. Dr Walker does not follow Ehrlich in believing that an animal can only make use of its own complement, or at most of complement derived from other animals of the same species. He has himself shown that in the case of guinea-pigs, treated with horse's immune serum for typhoid infection, suitable complement can be supplied from the fresh serum of the ox, rabbit, or pig. The concluding lectures are on Fever and maintain the same high level as the rest of the book, which should prove most useful to all senior students, and will be found very suitable by practitioners desiring to have a complete and readable account of all the latest work on a difficult subject.

NOTES ON DRUGS, &c.

Messrs Cox & Co. have sent us some samples of their preparations. All the preparations are well made, and neatly put up. The **Effervescent Lithia Tablets** are very handy, and

should prove useful. Messrs Cox & Co. specialise in the manufacture of pills, and in this they have attained a very high degree of excellence and a well deserved position of eminence.

From the **British Druggists Co.** come samples of **Hopogan** and **Ektogan.** The former is the dioxide of magnesium and the latter the peroxide of zinc. Hopogan is recommended in anæmia if the administration of oxygen is indicated. The addition of dilute mineral acid leads to the formation of peroxide of hydrogen and some free oxygen. Ektogan is used externally, and it too gives off H_2O_2 when a dilute acid reaches it. It is advised that it be prescribed along with one of the organic acids, particularly tannic acid. The preparations are interesting, and are worth a trial.

An interesting illustrated pamphlet, entitled "The Waters and Baths of Vichy," has just come from the pen of Dr C. E. Cormack of Vichy and Hyères, son of the late Sir John Rose Cormack of Paris. One may reach Vichy from Paris in six hours. It is worthy of note, that from the pen of the famous Madame de Sévigné, in the seventeenth century, came the first account of the celebrated thermal waters of Vichy. It was, however, Napoleon III. who made them *bien connu.* These noted waters are chiefly composed of free carbonic acid and bicarbonate of soda. The victims of gout, rheumatism, hepatitis, diabetes, dyspepsia, cystitis, gravel, chronic Bright's, etc., visit Vichy. The new and well-appointed bathing establishment may be considered one of the finest in existence, some of the bath-rooms being quite *de luxe.* The bath douche, in every form, including *lavage de l'estomac,* both with ordinary and mineral waters, is provided. The Mecano-Therapy Institute, which forms part of the establishment, might be considered *la grande nouveauté* at present; here active and passive muscular movements may be had for each individual muscle. Where one cares to combine pleasure with treatment, there is ample scope for the former in the Casino with its Salle de Spectacle, Salle de Jeux, Salon de Fêtes, and in the adjoining beautiful gardens and terraces. The season lasts from 1st May to 30th September. During the past, Vichy has perhaps been more patronised by Americans than British, but, under the existing *entente cordiale* between France and Britain, many British invalids will be enabled to benefit by its waters.

All Communications—including **BOOKS** *for* **REVIEW** *and* **EXCHANGE JOURNALS**—*are to be addressed to* THE EDITORS, 7 *Manor Place, Edinburgh.*

THE SCOTTISH
MEDICAL AND SURGICAL
JOURNAL

DELAYED CHLOROFORM POISONING[1]

By HAROLD J. STILES, M.B., F.R.C.S.Ed.,
Surgeon to the Royal Edinburgh Hospital for Sick Children
and
STUART M'DONALD, M.B., F.R.C.P.Ed.,
Pathologist to the Royal Edinburgh Hospital for Sick Children

THE interest of one of us in Delayed Chloroform Poisoning was first aroused by Dr Leonard Guthrie, a fellow member of this Society. Athough the occurrence of delayed chloroform poisoning had been recognised in Germany, we are indebted to Dr Guthrie for directing attention to the subject in this country. His first paper (1) on "Some Fatal After-Effects of Chloroform on Children," published in the *Lancet* ten years ago, was at once recalled to my (H. J. S.) mind by a case which occurred in the Royal Edinburgh Hospital for Sick Children in 1899, soon after I became surgeon to that institution. So little reference is made to delayed chloroform poisoning in English medical literature that it is necessary before recording our own observations to give a chronological review of the work already done on the subject.

Casper (2), in 1850, was the first to direct attention to the dangerous after-effects of chloroform. He maintained that chloroform may exert a poisonous action on the organism, hours, days, or even weeks after its inhalation, and speaks of the condition as chronic chloroform poisoning. The first case which he regarded as of this nature was that of a woman who

[1] Communicated to the Society for the Study of Disease in Children, May 6th, 1904.

died nine days after amputation of the leg with symptoms referable mainly to the brain.

Casper's teaching was accepted by Langenbeck (3), who, in the same year, ascribed a death seventeen hours after operation to the after-action of chloroform. The patient, a man, aged 36, had had his scapula excised. The operation lasted three-quarters of an hour. The patient's condition was very satisfactory until the evening of the operation, when vomiting set in and persisted all night. The following morning he was pale, the pulse was small and frequent, and the vomiting continued. The respirations were free and regular, but the pulse became progressively more rapid and feeble, and the patient died at 8.30 P.M. the day after the operation. At the post-mortem the liver was found to be very fatty. No further evidence in support of the views of Casper and Langenbeck were brought forward until 1866, when Nothnagel (4) published the results of his experiments on rabbits. In some of the animals chloroform was introduced into the stomach, and in others into the subcutaneous tissue of the back. On examining the organs some days later, marked fatty degeneration of the liver and heart was found in both instances. When introduced subcutaneously, fatty degeneration of the kidneys was also produced, and the urine which was expressed from the bladder four hours after the injection was found to contain red blood-corpuscles and fibrinous casts. In one of his experiments Nothnagel removed a piece of liver, for the purpose of comparison, before injecting the chloroform. He came to the conclusion that the fatal action of chloroform was not due to pre-existing disease in the affected organs. He favoured the view that chloroform produced fatty degeneration by directly destroying the red blood-corpuscles, and compared its action with that of the bile acids, arsenic and phosphorus. Similar experiments were performed with ether, which produced only a very slight fatty change.

In 1883, Ungar and Junkers (5) were the first to demonstrate in animals the fatty change produced by chloroform when administered by inhalation. In the first set of experiments rabbits were employed, but it was found difficult to keep those animals continuously under the influence of the anæsthetic for any great length of time without a fatal result. It was

therefore found necessary to interrupt the administration of the chloroform from time to time. In two experiments in which the animals died unexpectedly after the anæsthesia had been kept up 70 and 90 minutes respectively, even microscopic examination failed to reveal any fatty degeneration. In their experiments Ungar and Junkers succeeded in producing only a slight fatty change in the heart. They attributed this to the fact that, in rabbits, they were unable to maintain a sufficient amount of the drug in the blood without producing an immediately fatal result. It is evident, however, from the results obtained by ourselves, as well as by other observers, that they killed the animals too soon after the administration of the chloroform, and before the fatty degeneration had time to develop. In a second series of experiments dogs were used, as it was found that in these animals anæsthesia can be kept up for much longer periods with less danger of causing sudden death. Ungar and Junkers were able to demonstrate extensive fatty change in the liver, heart, and voluntary muscles in an animal killed forty-eight hours after a single prolonged administration of chloroform. By repeated administrations, in addition to the changes in the liver and heart, they were able to produce fatty degeneration in the kidneys, the spleen, and in the mucous membranes of the respiratory and alimentary tracts. Ungar and Junkers, after finding that a certain amount of fat was normally present in the convoluted and straight tubules of the kidney in dogs, excised one of these organs, and found that it contained much less fat than its fellow, which was not removed until after the anæsthesia had been continued for a much longer time. In one experiment there was produced a degree of fatty degeneration such as is rarely met with in phosphorus or arsenic poisoning. It is worthy of note that they were able to demonstrate fatty degeneration of the heart in one animal dying suddenly at the commencement of a second administration as early as twenty-four hours after the first, which had been kept up for two hours. In another experiment, in which the interval between the first and second administration was fifteen hours, the animal died during the second day after the second administration, which was of comparatively short duration. The animal had apparently quite recovered from the first, but the authors point out

that no doubt the fatty change set up by the first administration was such as to enable a comparatively small amount of chloroform to prove fatal on the second occasion. They suggest that in anæmic, alcoholic, or cachectic patients, or in those who have suffered from long-continued pyrexia, an ordinary dose of chloroform may prove dangerous by producing a fatty change which would not have occurred had the patient been healthy.

Ungar states that Volkmann and Kœnig agree that deaths attributed to shock after prolonged operations may be due to the chloroform. Especially after operation on children, says Volkmann, " I have observed a series of fatal cases, presenting the symptoms of so-called shock, which I attributed to chloroform, while others would attribute them to carbolic poisoning."

One of us, who has performed a large number of major operations on very young children, is satisfied that far too much is made of shock as a cause of death in children. If care be taken not to poison the child with antiseptics, and if undue loss of blood be prevented, serious operations, including abdominal operations, may be performed on even the youngest infant without fear of death from shock.

In discussing the *modus operandi* of chloroform in producing these fatty changes, Ungar and Junkers state that they are unable to accept the view of Nothnagel and others that they are the result of destruction of the red blood-corpuscles, but would rather attribute them to the direct action of the drug on the tissues, due possibly to the setting free of chlorine, which plays the same rôle that, according to Binz, iodine does in the fatty degeneration seen in iodoform poisoning. In confirmation of this may be mentioned the observation of Kast (6), that chloroform on reaching the blood after inhalation sets free its chlorine, which is excreted in the urine. Zeller has found the same to be the case after administration by the mouth.

In a later edition of Casper's work the term " protrahirte Wirkung des Chloroformes " has been substituted for " die chronische Chloroform Vergiftung " originally employed by that author. Ungar very properly objects to this term, as it gives rise to the erroneous impression that death results from the persistent and uninterrupted action of the chloroform

and that the individual remains until death under the persistent influence of the poison in the body. Ungar prefers the term "tödliche Nachwirkung der Chloroforminhalationen," which is certainly better.

Strassmann (7), in 1889, confirmed the observations of Ungar, and showed that chloroform caused an increased excretion of nitrogen in starved animals, thus pointing to the increased destruction of proteids. From these observations he concluded that the fatty change produced by chloroform was a degeneration and not merely a fatty infiltration. Moreover, he showed that by bleeding the animal before administering the chloroform the fatty degeneration of the liver was more marked. It is important to note that in two of Strassmann's experiments, in which the animals had been anæsthetised for three and five days respectively, the organs were found to be free of fat sixteen and fourteen days later. Schenk, whose experiments are referred to later, finds distinct evidence of fatty degeneration weeks after an administration lasting only one to one and a half hours.

In the same year (1889) Ostertag (8) experimented on rabbits, guinea-pigs, rats, pigeons, cats and dogs, and was able to confirm the results of Ungar. He sums up his results as follows:—

(1) Fatty infiltration of the liver and fatty metamorphosis of the heart, the skeletal muscles, the kidneys and the stomach, can be produced in various animals as the result of the long continued inhalation of chloroform.

(2) The fatty metamorphosis of the organs is the result of the action of the chloroform on the blood (destruction of the red blood-corpuscles) and on the cells of the tissues themselves.

(3) Certain individuals show such a strong susceptibility to these actions that they succumb to them at a shorter or longer time after the inhalation.

(4) The fatal after-action of the chloroform is brought about by paralysis of the heart, which may be attended by only slight anatomical evidence of injury to the myocardium, and by a gradual overloading of the blood with carbonic acid.

Ostertag believes that the fatty change in the liver is an infiltration and that the fat which is deposited there is derived

from that which results from the fatty metamorphosis of the heart and kidneys.

In 1890 Thiem and Fischer (9) published under the title "Ueber tödliche Nachwirkung des Chloroformes" the case of a man who died four days after an operation on the knee-joint for the removal of extravasated blood. At the post-mortem there was found both fatty infiltration and fatty degeneration of the liver. The kidneys were normal.

In the following year Bastianelli (10) reported three cases in which death occurred from three to ten days after anæsthesia. The chief symptoms were extreme restlessness, severe vomiting, cerebral excitement, followed by collapse and death. Jaundice occurred in one of the cases. The post-mortem revealed intense fatty degeneration of the liver, and, to a less extent, of the kidneys and heart. There were also sub-serous hæmorrhages.

We are indebted to Fraenkel (1892) (11) for the first detailed description of the naked eye and microscopical changes which may result in the human subject from the inhalation of chloroform. Fraenkel made a very careful investigation of the organs in five cases in which chloroform had been administered for from two to four hours. The deaths occurred from forty hours to twenty days after the operations. The heart showed marked fatty degeneration in all the cases. In the kidneys there was marked degeneration of the epithelium, especially of the convoluted tubules, varying in intensity from cloudy swelling to actual necrosis; in one case there was marked fatty degeneration. Although Fraenkel laid less stress on the changes in the liver, he was able, in four out of the five cases examined, to detect a fatty change, especially at the periphery of the lobules. The liver cells were degenerated and their nuclei often necrosed or badly stained. Fatty degeneration was also observed in the voluntary muscles, and in the ascending aorta.

Fraenkel, after comparing the morbid changes above referred to in the parenchymatous organs with those found in patients dying from sepsis, etc., came to the conclusion that the former were specific for the action of chloroform. He lays stress on the fact that he found a considerable deposit of a light orange-yellow pigment in the kidneys and liver, and

suggests that its presence seems to lend support to Ostertag's view that the delayed poisonous action of chloroform is due to its destructive action on the red blood-corpuscles. At the close of his paper he refers to the case of a strong muscular man, aged 38, who died sixteen days after resection of the pylorus for carcinoma. In spite of the fact that he was kept under chloroform for four hours, the heart, liver, and voluntary muscles showed no abnormality, and only a very slight parenchymatous degeneration was present in the kidneys. The patient died of gangrene of the lung. He mentions this case because it seems to support the view that idiosyncrasy plays an important part in chloroform poisoning, a point which is brought out also by the experiments of Heintz and others. Fraenkel states that patients no doubt often recover when the morbid changes produced by the chloroform are less severe than those he described. He makes the important observation, however, that the clinical symptoms may be very slight even in cases in which, at the post-mortem, the heart, liver and kidneys are shown to be extensively degenerate.

Guthrie's first paper, entitled "Some Fatal After-Effects of Chloroform in Children," published ten years ago, was the first important contribution to the subject in this country. In this paper he reports nine cases in which death is attributed to the after-effects of the chloroform, and one in which recovery took place. He stated that he was unable to account otherwise for the fatalities after the operations than by supposing—(1) that the deaths were due to auto-intoxication; (2) that the fatty condition of the liver, and, therefore, functional disturbance of the organ, existed before the operations; and (3) that chloroform and operation-shock combined aggravated the condition already present, and those loaded the system with toxic alkaloids which the kidneys, in cases 6 and 7, were unable to eliminate. Continuing, Dr Guthrie says: "The practical results of such views are—(1) That in no case should chloroform be given to patients suffering from fatty liver; (2) that as it is impossible from physical signs and symptoms to do more than surmise the existence of fatty liver, we must rely on signs of functional inactivity of the liver, as indicated by the excess of alkaloidal substances present in the urine; (3) that the precise nature of such alkaloidal substances and the best

methods of detecting them must be left for further investigation." The conclusions arrived at by Dr Guthrie do not appear to have been accepted in this country; indeed, no further reference was made to the subject until Dr Guthrie, in a second paper (12), published in 1903, brought forward further observations in support of his thesis. The title of this paper, viz., "On the Fatal Effects of Chloroform on Children suffering from a Peculiar Condition of Fatty Liver," differs from that of his first paper in order to emphasise his contention that the liver is already fatty before the chloroform is administered, and that the latter merely acts as the "last straw." In all but the first two cases recorded in his first paper, however, there were concomitant factors which probably had as much to do with the fatal results as the chloroform.

Dr Guthrie states that the four additional cases recorded in his second paper seemed to prove the following: (1) That neither carbolic acid poisoning nor fat embolism will account for these mysterious fatalities; (2) that the severity of the operations has little, if anything, to do with the cause of death; (3) that the only pathological condition commonly found after death is a peculiarly intense degeneration or fatty infiltration of the liver. This condition was found in five of the first series, and in three of the second series of cases . . .; (4) the only other circumstance common to all the cases was that chloroform had been administered some hours or days before death. We are, therefore, driven to seek an explanation in the morbid state of the liver which was demonstrated in 8 cases out of 14, and which can therefore not be regarded as a pure coincidence, and also to enquire again what part (if any) was taken by the chloroform in producing it.

Guthrie states that all authorities seem united in ascribing the pathological changes met with after death to the action of chloroform alone, whereas he formerly held, and still believes, that chloroform only takes the rôle of the "last straw" in the matter. Guthrie explains the deaths as follows: "(1) The liver being, previously to the operations, in an advanced state of fattiness, was probably on the verge of functional inadequacy with regard to elimination of toxines entering the portal circulation, though still able to hold its own in ordinary circumstances. (2) Chloroform, by decreasing oxidation already deficient, aggra-

vated the condition of fattiness already present, and so lowered the hepatic function that ptomaines or toxines escaped into the general circulation. (3) Chloroform, moreover, by its specific action on the kidneys, prevented the elimination of such poisons by the urine, and was thus again immediately concerned in the cause of death." Moreover, it is to be noted that Guthrie holds that in children, the form of fatty liver here referred to is altogether peculiar to these cases of fatality following operations under chloroform. Guthrie states that he is familiar with most kinds of fatty liver, but he has never seen the pale fawn or buff-coloured variety, except in such cases as these. The distinction is that the fatty change affects the entire organ uniformly, and is not confined to portions of it. He states that the nearest approach to these appearances is in acute yellow atrophy, but, in this connection he very rightly says that the liver in these cases is not atrophied.

Ambrosius (13) reports a case of pyosalpynx. The operation lasted three hours. Death occurred ninety hours later with symptoms of gradually increasing collapse. The post-mortem revealed no peritonitis. There was fatty degeneration of the renal epithelium, mainly in the collecting tubules, and necrosis of the convoluted tubules. The heart showed fatty degeneration and fragmentation. In discussing the case, Ambrosius calls attention to the persistent rapid breathing, indicating, in his opinion, some action not only on the cardiac nerves, but also on the ganglion cells of the central nervous system.

Becker (14) examined a large number of specimens of urine from patients after anæsthesia, and found an increase of acetone in the urine, especially after chloroform. The duration of the narcosis seemed to be of no importance. Children are apparently more susceptible than adults, and their urine contained a relatively larger amount of acetone. Existing acetonuria, as, for example, in diabetes, was greatly aggravated by chloroform. He holds that acetonuria is due to an increased destruction of albumin. Luzatti largely confirms the observations by Becker. He found, however, that the acetonuria was in proportion to the amount of chloroform inhaled.

Nachod (15) examined the urine in 57 cases of chloroform anæsthesia. The ages of the patients varied from one to fifteen

years. He found serum-albumin, nucleo-albumin, and casts, either alone or in various combinations, in a few cases. According to Nachod, existing albuminuria is not increased after chloroform. He describes a parenchymatous degeneration of the kidney in a child dying twenty-four hours after an operation for hare-lip, the condition exactly resembling that described by Fraenkel and Eisendrath (16). Nachod never found glucose in the urine after chloroform, but many have found other reducing substances. He reports, however, a case of glucosuria and diabetic coma occurring after chloroform-anæsthesia in a patient who had sugar in the urine some time previously, but not immediately before the operation. He relates three other cases illustrating the danger of chloroform in diabetics. Referring to the excretion of acetone in the urine of patients after chloroform, he found that acetonuria occurred in 30 out of 57 cases, but seldom lasted more than three days; in 14 cases aceto-acetic acid occurred along with the acetone. Bile pigments were never found, but urobilin was frequently demonstrated, being usually first seen about the second or third day, and continuing till the fourth. Its presence is attributed to the destruction of the red blood-corpuscles. Nachod holds that the changes in the kidneys and the metabolic disturbances leading to the altered urinary excretion are directly due to the action of the chloroform. He concludes by describing a case where death occurred twenty-four hours after chloroform-anæsthesia, and in which there was fatty degeneration of the convoluted and straight tubules, and degeneration of the nuclei along with healthy glomeruli and no signs of inflammatory mischief; he believes that these are the changes which exist in the cases in which the chloroform has set up albuminuria and the formation of casts. The variations in the behaviour of the kidneys towards chloroform is attributed by Nachod to idiosyncrasy.

Hill Abram (17) examined the urine in 25 cases after anæsthesia, and found acetone present 16 times (64 per cent.) He states that the quantity of the anæsthetic used bears no relation to the degree of acetonuria. Ether, though it always causes acetonuria, does so to a less extent than chloroform. Abram therefore agrees with Becker that acetonuria follows anæsthesia, and that it is increased by it if already present. According to Le Noble the acetone is a product of albumin destruction, but

if this be the source the amount of the acetonuria should bear some relation to the amount of the anæsthetic used.

Babaci and Bebi (18) investigated the urine after anæsthesia, 54 of the cases being chloroformed and 41 etherized. They observed albuminuria in 18.89 per cent. of the chloroform cases, and in 36.6 per cent of the ether cases ; three of the latter had previous albuminuria, and two died. A third fatal case, in which there was no previous albuminuria, died five days afterwards ; the sectio showed long-standing nephritis. They further studied experimentally the action of chloroform and ether on the kidneys of dogs, rabbits and guinea-pigs. In the etherized rabbits a diffuse hæmorrhagic nephritis was produced, which tended to pass off spontaneously, leaving a healthy functionating kidney. With chloroform, on the other hand, albuminuria was not so frequently produced, but when present it appeared to be associated with a parenchymatous nephritis of more chronic type.

Steinthal (19) describes what he regards as a typical case of chloroform poisoning after an operation for a fistula of the cæcum, secondary to perityphlitis. The operation lasted two hours. Death occurred five days afterwards. On the second day the patient became jaundiced, the pulse was rapid (130), there was slight albuminuria and considerable hæmaturia, but no casts were present. Death was preceded by coma. The post-mortem revealed no peritonitis ; there was fatty degeneration of the liver, heart and kidneys, the latter showing also evidence of commencing hæmorrhagic nephritis.

Ajello (20) examined the urine in 214 patients who had been anæsthetized with chloroform. He found that chloroform produced albuminuria in a varying percentage, as high as 80 per cent. It is usually slight and temporary, however, lasting from two to six days. Casts were seen in 60 per cent. of the cases ; they were few and temporary. He considers that chloroform produces considerable disturbances of nutrition, and that it has a destructive action on the blood. The after-effects depend on various factors, viz., the duration of the anæsthesia and the amount of chloroform used, or on some special idiosyncrasy. He says that the results may be very severe where there is previous organic disease of the heart, kidneys or vessels ; or where there is sepsis, diabetes or cachexia, and,

lastly, where there has been repeated anæsthesia at short intervals. Ajello also studied the morbid histology in four autopsies after death from chloroform, and in numerous dogs anæsthetized and killed at various periods. His conclusions are :—

(1) Chloroform produces acute parenchymatous changes of an inflammatory and degenerative character; the degree and intensity of the changes are, to a certain extent, proportional to the duration of the anæsthesia and to the amount of chloroform inhaled.

(2) These changes consist in fatty degeneration and necrosis of the epithelium of the kidneys and liver; and there are also degenerative changes in the heart, striped muscle, spleen and blood.

(3) These morbid conditions are not definitely characteristic of chloroform, for they are produced by all toxic substances (generally products of infective organisms) which gain entrance to the internal organs, or which are formed in them.

They generally pass away, leaving the organs perfectly normal; but they can also cause death, especially from uræmia; only seldom do they assume a chronic type.

Chiarleoni (21) has seen three cases of cholæmia after laparotomy, during which the liver was not specially interfered with. He has frequently seen bile pigments in the urine after chloroform anæsthesia, and considers that this is directly due to the chloroform.

Grube (22) has noted the injurious effects of repeated administration of chloroform on the kidneys. He did not, however, notice any increase of pre-existing albuminuria. He seldom found sugar in the urine after chloroform, but there was almost always an increase in its reducing power. He also noted increased excretion of uric acid, chlorides, phosphates and sulphates, indicating, in his opinion, deficient oxygenation as well as destruction of red blood-corpuscles. He also frequently found urobilin, but seldom glucosuria and hæmoglobinuria. He states that the cause of death in such cases is an auto-intoxication.

Zachrissen (23) reports five cases of delayed chloroform poisoning. He also made a careful examination of the urine of 100 cases after chloroform anæsthesia and 94 after chloro-

form-ether anæsthesia. His conclusions are: (1) In both there is often slight transient albuminuria. (2) In the chloroform cases it appeared in from 24.5 to 38 per cent., while in the chloroform-ether cases it appeared in 21.17 per cent. (3) The frequency appears proportional to the length of the operation. (4) In both casts are often seen, more often in the chloroform cases. (5) If albuminuria or casts be present before the anæsthesia, the condition is generally aggravated. He attributes the above changes to a destructive action on the renal epithelium, and advises sub-cutaneous injection of saline immediately after the operation.

Eisendrath (24) examined the urine of 139 cases after general anæsthesia, and concludes that—(1) Already-existing albuminuria is aggravated more often by ether than by chloroform. (2) Albuminuria appears more often after chloroform than after ether—after chloroform in 32 per cent., after ether 25 per cent. (3) The influence of both on waxy kidneys is the same. (4) Cylindruria appears with or without albumin, as frequently after chloroform as after ether, but diminishes quicker after the latter. He describes also the post-mortem appearances in a patient who died from pulmonary embolism eleven days after a herniotomy, chloroform being the anæsthetic used. For the first two days after the operation there was an acute cylindruria, but the urine was always free from albumin. Examination of the kidneys at the post-mortem showed cloudy swelling of the epithelium and necrosis of the nuclei of the convoluted tubules, a change which could only have been caused by the action of the chloroform.

It is only reasonable to conclude that if chloroform can produce parenchymatous degeneration in the kidneys, it is almost certain to produce similar changes in the liver and heart, a conclusion which is borne out by post-mortem observations as well as by experiments in animals.

Bandler (25) deals especially with the action of chloroform on the liver. He reports a death after an operation lasting one hour, for incarcerated hernia. Apart from the hernia, the patient was a strong, healthy man. No antiseptic was used. The symptoms which followed the operation closely resembled those of acute yellow atrophy. On the second day there was distinct jaundice and the urine contained bile pigments. On

the third day the jaundice was very pronounced, the urine contained much albumin and granular hyaline casts. The patient became very apathetic, and passed very little urine; in the evening he became suddenly violent and delirious. Next morning he was completely unconscious, and small hæmorrhages appeared over the abdomen. The urine contained leucin and tyrosin. Death occurred on the following day. Diagnosis: acute yellow atrophy. Sectio: wound healthy; no peritonitis; liver intensely yellow, normal in size, and surface smooth; kidney capsules stripped with difficulty, and on section parenchyma pale and bile-stained; heart muscle pale, flabby, with increase of sub-pericardial fat. The trachea and œsophagus showed numerous hæmorrhages in the mucous membranes, and there were others in the skeletal muscles, especially those of the trunk.

Microscopically the liver showed the cells converted into a granular debris mixed with large and small oil droplets, with here and there remains of the nuclei; the outlines of the cells had almost entirely disappeared. The convoluted tubules of the kidneys showed cloudy swelling going on to necrosis. The muscular fibres of the heart were also degenerated.

Bandler regards the case as one of acute yellow atrophy occurring in a previously healthy man after an operation of no great severity. He expresses the opinion that the condition resulted from the action of the chloroform on a liver previously fatty, and draws attention to the investigations of Pohl (30), who holds that the chloroform which combines loosely with the red blood-corpuscles is set free in the presence of cholesterin and lecithin, and that the degenerative changes in the kidneys are due to the direct action of the chloroform, or are secondary to the liver condition. While Bandler states that this is the first published case of acute yellow atrophy due to chloroform, he is of opinion that some of the recorded cases of this disease which have followed operation were really due to chloroform. He mentions a similar case of von Erlach's in which the patient, before operation, suffered from gastric catarrh and simple catarrhal jaundice.

Bandler then gives the results of his experiments on the action of chloroform on the liver of rabbits and dogs. Comparative investigations made with ether.—Out of the four dogs

and four rabbits anæsthetized with ether, Bandler only found a very slight degree of fatty change in the liver of one of the dogs, thus confirming the observations of Strassmann.

Marthen (26) reports a fatal case of delayed chloroform poisoning in a woman, aged 34, who was anæsthetized for 40 minutes for the removal of a large number of teeth. She died on the fourth day. The symptoms were: persistent vomiting, increasing jaundice, restlessness and delirium followed by lethargy, Cheyne-Stokes breathing, and, finally, heart failure. The urine contained albumen and hyaline and fatty casts.

Post-mortem.—General icterus; no cutaneous hæmorrhages; heart flabby, yellowish brown, and streaked with sub-endocardial hæmorrhages; kidneys bile-stained, enlarged, flabby; cortex thickened, and a few hæmorrhages in the pelvis. Liver smaller than normal, yellow, very flabby, surface smooth; on section, lobules unusually distinct, centres dark red, peripheries intensely yellow, due to fatty change.

Microscopic examination.—Kidneys: cloudy swelling and fatty degeneration, especially of the convoluted tubules; glomeruli normal; golden yellow pigment in the epithelium and between the tubules.

Heart: cloudy swelling with some increase of pigment; striation for the most part retained; a few fibres homogeneous; many of the fibres transversely segmented; no fatty degeneration.

Liver: cloudy swelling; fatty infiltration at the periphery of the lobules; nuclei seen imperfectly at the peripheral and not at all in the central zone; some diffuse thickening of the connective tissue, not only in the portal tracts, but also in the interior of the lobules; fatty change best seen in the peripheral zones; a small amount of golden yellow pigment in the peripheral zones.

In reviewing the case from a clinical point of view, Marthen emphasises the jaundice, the condition of the urine, and persistent vomiting; the latter symptom, he says, should always call for a careful examination of the urine. Along with Fraenkel, he points out that the morbid condition of the urine is by no means a measure of the extent of the parenchymatous degeneration in the kidneys.

Heintz (27) records the clinical history and the results of

the post-mortem examinations in slight cases in which death was attributed to delayed chloroform poisoning. He performed a series of experiments on rabbits in order to ascertain the pathological changes produced by chloroform a relatively short time after one, two or three inhalations, each lasting two hours. Control observations were made on rabbits to which no chloroform had been administered. In one case the animal was anæsthetized six times at intervals of two or three days for the purpose of ascertaining the maximum effect of the chloroform. The animal died during the sixth administration. It was found that there was a considerable difference in the susceptibility to the action of chloroform in the different animals. Various combinations and various degrees of degeneration occurred in the heart. These changes consisted in loss of transverse striation, fibrilation, and segmentation of the muscular fibres, along with disappearance of the nuclei. Unlike previous observers, he could not detect any evidence of fatty degeneration of the fibres. The changes in the liver, however, were the same as those produced by other experimenters, and consisted especially in fatty degeneration. As in the human subject, the kidneys were less affected than the heart and liver. From the post-mortem appearances found in the human subject, and the experimental results obtained in rabbits, Heintz comes to the conclusion that a single prolonged inhalation of chloroform is able to give rise to subsequent pathological changes in vital organs which may be fatal in twenty-four hours or several days, and this in spite of the fact that the patient had completely come out of the chloroform.

Heintz has shown that the changes in the internal organs are by no means proportionate either to the amount of the anæsthesia or to the amount of chloroform employed ; he concludes, therefore, that idiosyncrasy plays an important part. The changes in the heart were found to be practically the same in the rabbits as those revealed at the post-mortems in the human subject, except that in the former the nuclei were not necrosed. The changes in the liver and kidneys were practically the same in both.

Heintz agrees with Ungar in attributing the degenerative changes in the organs to the direct toxic action of the chloroform, and he regards the fatty change as a degeneration rather

than an infiltration. He is of the opinion that the changes in the kidneys are so slight as compared with that found in the other organs that death cannot be attributed to uræmia.

Heintz draws the following conclusions from his observations: (1) That the occurrence of delayed chloroform poisoning must be admitted. (2) That death may take place five days or longer after the administration. (3) It may follow either a single prolonged administration or repeated administrations at short intervals. (4) Characteristic changes are found in the organs of human subjects dying from prolonged chloroform poisoning. (5) The changes consist in degenerations of the cells, the result of the direct toxic action of the chloroform. (6) The changes in the heart consist in degeneration of the muscular fibres and disappearance of the nuclei. (7) The liver shows fatty degeneration and necrosis of the epithelium. (8) The kidneys, which are not so rapidly affected as the heart and liver, show cloudy swelling, and, in severe cases, necrosis of the epithelium. (9) The chief clinical symptoms are: severe and long-continued vomiting, rapid pulse and psychical disturbances. (10) Slight degenerative changes in the organs may be recovered from. (11) Death usually takes place suddenly, with symptoms of collapse. (12) The cause of death cannot be attributed to functional disturbances of a single organ. (13) Death is the result of a general intoxication which produces pathological changes in most of the vital organs.

Schenk (28) made investigations on apes and dogs with the object of ascertaining how soon the fat appears in the organs after the anæsthesia, and when the organs become free from fat again. In healthy dogs in which no chloroform was administered he found a certain amount of fat in the heart, kidneys and liver, in the latter in the form of the finest droplets within the liver cells. In each experiment, before giving the chloroform, a small piece of liver was excised for purposes of comparison. The animals were killed at various periods, viz., immediately after anæsthesia, and at the end respectively of 12, 24, 48 hours, and several days, up to four weeks. He performed two experiments with ether for purposes of comparison, and found that while fat appeared in the liver it was very slight in comparison with what was found after

chloroform. He deals in detail only with the changes produced in the liver, because it was only in this organ that a comparison was made with the condition before anæsthesia. His observations on the heart and kidneys confirm those of previous investigators. The experiments show that the fat which appears in the liver some hours after chloroform anæsthesia in some instances does not disappear for days, indeed sometimes not for weeks. He was unable to confirm Strassmann's observations that the fat disappeared from the liver fourteen days after somewhat prolonged administrations: in all his experiments fat could be detected at this period in spite of the fact that the anæsthesia was not so prolonged as in Strassmann's experiments. He concludes by cautioning gynæcologists against giving chloroform a few days after its employment for diagnostic purposes.

Salen and Wallace (29) report two cases. The first, which resembles Bandler's cases, was that of a woman, aged 20, who had undergone a laparotomy of two hours' duration for salpingo-oophoritis. Jaundice appeared the day after the operation, the other symptoms being great weakness, rapid and feeble pulse, collapse, and death on the third day.

Post-mortem.—Wound and peritoneum healthy; no swelling of spleen; advanced fatty disintegration of liver; fatty degeneration of heart and kidneys.

In the second case death occurred two days after operation for appendicitis. The urine contained albumin and casts, and complete anuria followed.

Post-mortem.—Wound and peritoneum healthy; spleen normal; marked fatty degeneration of heart, liver and kidneys.

Dorner (30) publishes the case of a child, aged 3½ years, who died forty-two hours after Bassini's operation for hernia. The operation was followed by slight albuminuria, a gradual rise of temperature, and increasing cardiac weakness. The wound was healthy. At the post-mortem there was found an enlarged thymus along with hyperplasia of the lymphatic system. The internal organs showed the characteristic fatty degeneration seen in cases of delayed chloroform poisoning. In this case the *status lymphaticus* no doubt rendered the organs specially susceptible to the toxic action of the chloroform.

Poroschin (31) gives the results of thirty experiments on the changes in the organs of dogs after chloroform anæsthesia. In addition to the degenerations in the various organs described by previous observers, he found degenerative changes also in the cardiac ganglia, and in the respiratory centre; also hyaline degeneration of the small arteries of the heart, stomach and malpighian bodies of the spleen.

Cohn (32) reports the case of a robust woman, aged 21, who was operated on for double salpingo-oophoritis. The operation lasted one hour, and the patient took a large quantity of chloroform. She remained in a half-conscious condition the whole day. During the night she was very restless, and had to be tied down in bed. She was, however, able to answer questions quite intelligently; pulse and temperature normal. On the following day she became drowsy and apathetic. The next day there was slight jaundice, and in the evening she again became excited and screamed out; temperature normal. Next day she became comatosed, cyanosed, and distinctly jaundiced. A few cubic centimetres of turbid urine were withdrawn, and found to contain albumin, granular and epithelial casts, a few blood-corpuscles, and some bile pigments; no sugar. She died at 8.30 P.M., five days after operation.

Post-mortem.—No cause of death connected with the operation. Liver yellow, flabby, not enlarged. Microscopical examination showed a fatty change in the peripheral and outer intermediate zones, the nuclei being obscured by the fat lobules; in the centre of the lobules an abundant deposit of yellow pigment; no evidence of an old inflammatory lesion. The heart showed foci of fatty degeneration along with some pigment. The kidneys showed marked cloudy swelling of the epithelium of the convoluted tubules; glomeruli normal.

The author states that death was due neither to sepsis nor to antiseptic poisoning, and that the only satisfactory explanation of the symptoms and post-mortem appearances was that the chloroform set up an acute intoxication.

Ballin (33) reports what he believes to be a recovery from acute yellow atrophy following appendicectomy. The symptoms were certainly suggestive of acute yellow atrophy. Wersung is mentioned as having collected 16 recoveries from the disease. Mintz, on the other hand, regards post-operative

cases of acute yellow atrophy as essentially septic, because in a case very similar to Ballin's he found bacterium coli in the liver, and a thrombotic process in the duodenal artery. Ballin points out the significant fact that no case of acute yellow atrophy has been recorded after the administration of ether.

Waldvogel (34) states that the original idea that acetone arises by the oxidation of carbo-hydrates, and that it is also a product of the destruction of proteids is untenable. Recent investigations have demonstrated that fat is the true source of acetone, as the latter is increased during starvation, and in diabetes. Carbohydrate, on the other hand, causes the acetonuria produced during starvation to at once disappear. Waldvogel points out that it is of interest to the surgeon to know that acetonuria after anæsthesia is due to fat destruction caused mainly by the toxic action of the anæsthetic.

Rydygier (35), in a paper dealing with kryoscopic observations on the urine after chloroform anæsthesia, states that chloroform does not set up any renal insufficiency when the kidneys are normal, but that it has a serious effect when the kidneys are diseased. The presence of nephritis he regards therefore as a contra-indication to its use.

Foerster (36) records two cases (from the clinic of Professor Schede, of Bonn) which are "with certainty to be regarded as deaths due to the after-action of chloroform." The first is that of a girl, aged 4 years, who died 48 hours after an osteotomy of both femora. The duration of the anæsthesia was 50 minutes. The operation was followed by increasing cardiac weakness and persistent vomiting, the vomited matter being almost black in colour.

Post-mortem. — *Liver.* — Somewhat enlarged. Surface smooth and of an orange-yellow colour; on section the whole organ was of the same uniform light-yellow colour, and the individual lobules could not be recognised. Sections stained with sudan showed an extreme fatty change, each lobule being affected throughout, but more so in the peripheral zones. The outlines of the cells were irregular and often quite obscured, but the nuclei had not disappeared.

Kidneys.—Cortex of a dirty yellow colour, and somewhat anæmic; medulla dark red. Microscopically (sudan staining)

the glomeruli were everywhere healthy and their nuclei well stained. The convoluted tubules were saturated with the stain, and to a less extent the looped and collecting tubules.

The heart showed a patchy fatty degeneration.

The second case was that of a girl, aged 11 years, who died on the 5th day after operation for a localised abscess, the result of appendicitis. Previous to the operation there was no evidence of any disease of the internal organs. For the first three days after operation the patient's condition was in every way satisfactory. During the 4th night she was very restless, and vomited frequently. Next day there was slight jaundice, she became somewhat delirious, and cried out constantly. The following day there was persistent coffee-ground vomiting, the pulse and temperature were elevated, and she died comatose. The urine contained bile pigments, but no albumin.

Post-mortem.—No suppuration or deposit of lymph beyond the immediate site of the abscess.

Liver.—Somewhat congested; deeply jaundiced; lobules very distinct, centres congested, peripheral zones yellow and swollen. Sections stained with sudan showed the same fatty change as in first case, the fat droplets being smaller and fewer in the central zones.

Kidneys.—Cortex thickened, yellow and cloudy. Microscopical examination revealed similar changes to those met with in the first case, except that only a few of the straight tubules contained fat.

Heart.—Muscular substance pale and cloudy, with a few punctiform hæmorrhages under the epicardium. The microscope showed, in osmic acid preparations, a finely granular fatty condition, uniformly distributed through the whole muscular substance of the heart.

Foerster points out that neither child had suffered from any constitutional disease, and that as far as he could ascertain there was no organic disease of their internal organs.

He asserts that the morbid changes found, more especially in the kidneys, afford sufficient proof that death was due to the after-action of the chloroform.

We shall now pass on to the consideration of our own observations, but before doing so, we desire to express our

thanks to Mr C. B. Paul, F.R.C.S.Ed., for the assistance he has given us in preparing abstracts of the literature.

In a paper on "The Radical Cure of Hernia in Infants and Young Children," read at the annual meeting of the British Medical Association, Cheltenham, 1901, one of us had to report three deaths in his first 100 cases, one of which he considered to be a typical case of delayed chloroform poisoning. It was that of a healthy girl, aged 4½ years, operated on on August 1st, 1900, for a left reducible inguinal hernia. The operation consisted in the ligature and removal of the sac, and the closure of the canal by two catgut sutures. No drainage; collodion dressing. The anæsthesia lasted twenty minutes. On the evening of the operation the pulse was a little quickened and the temperature 101°. The patient passed rather a restless night and vomited frequently. Next morning (Aug. 2nd) there was a slight icteric tinge of the skin. The vomiting continued at intervals all day. In the evening the patient looked rather collapsed; pulse 110, but quite regular; temperature 100°; tongue moist and clean.

August 3rd.—"Has not kept anything in stomach since operation; jaundice quite distinct; urine contains a considerable quantity of albumin."

Evening.—"Looks decidedly ill; pulse 140; temperature 103°. Has only passed 6 oz. urine in the last 24 hours. Bowels have not acted."

August 4th.—"Very ill this morning; pulse 156; has been delirious for the last six hours; no urine secreted since 4 P.M. yesterday. Died comatose at 6.30 P.M. The temperature shortly before death reached 104.8°."

Post-mortem.—Wound and peritoneum healthy. Liver very yellow to the naked eye; intensely fatty. Microscopically the liver cells were filled with oil globules of various sizes and their outlines obscured; in some places the cells appeared to be disintegrated. In the kidneys there was marked cloudy swelling, almost amounting to necrosis of the epithelium, especially of the convoluted tubules; the nuclei stained either imperfectly or not at all. The sections were not stained specially for fat.

As some surgeons do not seem to have recognised the condition, it may be as well, in the first place, to describe some-

what more in detail the clinical and pathological features of a case which occurred subsequently to the above, and which we believe to be typical of the condition.

Jane R., aged 8 years, a well-nourished, somewhat florid and healthy-looking girl, with no evidence of organic disease, was operated on for genu valgum in the Royal Hospital for Sick Children, at 11 A.M., on October 21st, 1902. As the abnormality was due to a well-marked overgrowth of the inner part of the lower end of the diaphysis of the femur, a wedge of bone was removed from this region by a modification of the method originally advocated by Chiene. There was no difficulty about the operation, and no shock. The total duration of the anæsthesia, including induction, was 22 minutes. The patient was a little sick after her return to consciousness. There was no further vomiting during the whole of the afternoon, and the child's condition was in every respect satisfactory. Later in the evening vomiting again set in, and continued at intervals throughout the night. The vomited matter, which consisted at first of gastric juice mixed with a little bile, became more copious and of a dark green colour, and finally presented the characteristic beef-tea-like appearance described by Guthrie. She complained of great thirst, cried out for drinks, and became very restless. Every now and then she attempted to throw off the clothes, and would frequently clutch hold of the bars of the crib and pull herself into awkward positions. In the intervals between these excited periods she appeared to be rather listless, and did not complain of any pain. The pulse became increasingly rapid and feeble. The breathing was natural. There was no involuntary passage of urine or fæces. The following morning the vomiting ceased, and the patient's condition was considered by Dr Price, the house-surgeon, to be more satisfactory. She was, however, a little flushed, and the pulse was still small and quick. At 1 P.M. the probationer tidied her bed, and gave her the drink she asked for. An hour later the sister noticed the child was looking collapsed, grey, and slightly cyanosed. The pulse was almost uncountable, unconsciousness rapidly supervened, and the patient died suddenly at 2 P.M., that is, 26 hours after the operation.

POST-MORTEM, *October 23rd.*—The body was that of a

well-developed child. Rigor mortis was general. Post-mortem lividity distinct. There was a recent osteotomy wound over the lower end of right femur. On opening up the wound the parts looked perfectly healthy; there was diffuse hæmorrhagic infiltration of the tissues for some distance around, but no evidence of septic infection.

Thorax.—No excessive exudation into either the pericardial or pleural sacs. The thymus was distinctly enlarged, extending down over the surface of the pericardium.

Heart.—Pericardium showed nothing abnormal. Right side of the heart contained dark fluid blood and soft post-mortem thrombus; the right side of the heart was not specially distended; the left ventricle was firmly contracted; the aortic and pulmonary valves were competent, and the cusps at the various orifices showed nothing abnormal; the myocardium itself was rather pale, but quite firm; there was no mottling or other distinct naked eye evidence of fatty degeneration.

The right lung.—Scattered over the visceral pleura, especially towards the root of the lung, were numerous small sub-pleural hæmorrhages, the largest measuring about $\frac{1}{8}$ inch to $\frac{1}{4}$ inch in diameter. There were also numerous areas of lobular collapse. Neither the root of the lung nor the large branches of the pulmonary vessels showed anything abnormal. The large bronchi were congested, and contained frothy mucus, at places blood-stained. On section the lung as a whole was congested, and there were numerous fairly sharply outlined areas of hæmorrhagic infiltration, giving a distinct mottled appearance. There was no distinct pneumonic consolidation at any part. There were no definite pyæmic foci, and no tuberculosis. The left lung showed practically the same condition, but the hæmorrhagic areas were rather smaller than on the other side and not so numerous.

ABDOMEN.—No peritonitis or other abnormality in the peritoneal sac. The stomach and pancreas showed nothing abnormal. Intestines presented no abnormality beyond some prominence of the lymphatic tissue towards the lower end of the small intestines. The mesenteric glands were slightly enlarged, soft and pale, and showed no evidence of tuberculosis.

Liver.—Distinctly enlarged; surface smooth, and the colour intensely yellow, almost of a canary tint. Scattered on

the surface were some small dark-red spots and streaks representing distended vessels; there were, however, no distinct hæmorrhages. On section there was seen to be an intense degree of fatty change uniformly distributed through the whole organ. The condition evidently affected the whole of the hepatic lobule, but at places the peripheries of the lobules had a more intensely yellow tint. There was no evidence of an infiltration of any kind in the portal tracts, and there was no indication to the naked eye of septic foci. Gall-bladder and suprarenals normal.

Kidneys.—Both were slightly enlarged and rather soft in consistence. The capsules stripped readily, leaving a smooth, extremely pale surface. The stellate veins were not unduly prominent. On section the most striking feature was the intense pallor of the cortex both superficial and deep. The cortex was also slightly swollen. In contrast to the pale cortex, the pyramids were rather prominent, but were not in reality unduly congested. The naked-eye appearance suggested an intense degree of cloudy swelling rather than diffuse fatty change. There was no yellow tint in the pallor. The malpighian bodies were not apparent; the vessels showed nothing abnormal; there was no hæmorrhage either in the cortex or in the pelvis; there were no septic foci to be seen. Bladder showed nothing abnormal. The spleen was not enlarged and was fairly firm. On section there was slight pallor. The malpighian bodies were not unduly prominent.

The brain showed nothing abnormal to the naked eye.

BACTERIOLOGICAL.—Cultivations were made on agar and blood-agar from the hæmorrhagic areas in the lungs. In twenty-four hours numerous small clear transparent colonies had developed.

On microscopical examination the growth proved to be one of pneumococcus, giving all the staining properties of that organism. Films made directly from the hæmorrhagic areas in the lungs were specially examined for the presence of bacteria and fat. No bacteria were found, but some very minute globules of fat could be demonstrated both free and inside endothelial cells.

HISTOLOGY OF THE LESIONS.—Pieces of the various organs were fixed and hardened in alcohol, and also in ten per

cent. formalin. These latter were specially examined for fat, sudan, and one sixth per cent. osmic acid being the stains used. The tissues were also examined for bacteria. Sections from the tissues in the neighbourhood of the wound showed diffuse hæmorrhagic infiltration of the tissues with a few polymorphonuclear leucocytes among the effused red blood-corpuscles. There was no histological evidence of a local septic infection, and no bacteria could be demonstrated.

Heart.—In many places the muscle fibres showed no abnormality. No fat could be demonstrated, here and there the fibres were somewhat granular and the transverse striation not quite distinct. There was no transverse segmentation of the fibres, and the nuclei everywhere stained perfectly; there was no pigmentary deposit, and no special hyperæmia.

Lungs. — Sections stained with hæmatin and eosin showed areas of hæmorrhagic infiltration into the alveoli. Here and there a polymorphonuclear leucocyte could be seen, and there was some desquamation of the endothelial lining. The alveolar capillaries were congested; the walls of the bronchi were also unduly hyperæmic, but there was no distinct evidence of an inflammatory change in either the bronchial mucosa or in the lung alveoli.

Sections stained by Gramm's method showed a few bacteria: some were morphologically identical with pneumococci, others were longer bacilli, not resembling any particular pathogenic form, and were thought to be probably putrefactive in nature. No bacteria were demonstrated in the lung alveoli. A large number of sections from different parts of both lungs were specially examined for the presence of fat. A very few capillaries in the alveolar walls were found to be blocked by short columns of oil giving the characteristic staining reaction with osmic acid and sudan. Very minute droplets were also demonstrated free in the alveoli, in the endothelial cells lining the alveoli, and in some of the desquamated endothelial cells. At places, too, there was an appearance of similar minute droplets in the endothelial cells of the alveolar capillaries; some very minute droplets free and inside desquamated cells were also seen inside some of the bronchi.

Liver.—Paraffin sections stained by hæmatin and eosin showed some fibrous thickening of Glisson's capsule, not amount-

ing, however, to an actual cirrhotic condition. There was no cellular infiltration in the portal tracts. The liver cells could not be satisfactorily demonstrated owing to the intense vacuolation, especially at the periphery of the lobules, the vacuoles representing spaces from which fat had been dissolved. There was evident degeneration of the cells, especially in the central zones, but the nuclei for the most part stained perfectly well. The most successful preparations were obtained by an ordinary freezing method, and stained by sudan, counter-stained with hæmatin. In those sections (Fig. 1) an intense fatty change in the cells was well demonstrated. In the central zones of the lobules the cells appeared rather diminished in size, the capillaries between the columns of cells being correspondingly dilated. The cells contained a great number of minute droplets of oil, which for the most part did not tend to coalesce. The nuclei were frequently obscured by the amount of oil present, but where seen were stained perfectly well. Immediately around the central venule many of the cells appeared to be completely disorganised. This change in the central zone extended into the intermediate zone, but the cells in the peripheral zones presented rather a different appearance. Here, for the most part, the oil droplets had coalesced into large globules, which displaced the nuclei to the sides of the cells. Where seen, however, the nuclei were stained perfectly well. There was no part of the hepatic lobule free from fatty change. The walls of the sub-lobular and hepatic veins were somewhat thickened, and in some of them, particularly in some of the hepatic veins, quite a considerable amount of oil could be demonstrated. Much of this appeared as free droplets. At places the droplets were grouped as if resulting from disintegration of a cell, and one or two distinct liver cells were seen closely resembling the disintegrated cells lying around the central hepatic venule. No fat was demonstrated in branches of the hepatic artery.

Kidneys.—Sections prepared and stained as above showed an intense degree of degenerative and fatty change in the renal parenchyma (Fig. 2). The change was practically universally distributed throughout the organ, the convoluted tubules, loop tubules, and collecting tubules all suffering. There was distinct cloudy swelling with a tendency to separation of the cells from

one another in the convoluted tubules. The fat was present as minute droplets, not tending to coalesce and specially situated between the nucleus and base of the cell. The nuclei throughout stained almost perfectly. There was no pigmentary change in the cells; there was a certain amount of granular precipitate in the tubules and between the capillary tuft and Bowman's capsule, but the malpighian bodies themselves showed nothing abnormal. In none of the renal vessels was any oil demonstrated. There was no leucocytic emigration at any point, and no cellular proliferation could be made out. Sections of the suprarenals, pancreas and brain showed nothing abnormal. In none of them could fat be demonstrated in the vessels.

Spleen.—Well-marked hyaline degeneration in some of the splenic arterioles and some proliferation of the endothelial lining of pulp sinuses.

The cause of death in such cases has been variously attributed to chemical poisoning from antiseptics, to fat embolism, to sepsis, and lastly, to delayed chloroform poisoning. We shall now consider these seriatim.

1. *Antiseptics.*

As carbolic acid was the only antiseptic employed in this case, we need not consider the toxic action of other antiseptics. That it is necessary, however, to consider the part played by carbolic acid is evident from the criticism offered to Guthrie's paper. In children it is well known that death may result from the absorption of carbolic acid by the skin. One of us who had the misfortune to witness a fatal case which occurred in the Edinburgh Royal Infirmary in 1887 advised Dr Kruger, the house-surgeon in charge of the patient, to take up the subject of the absorption of carbolic acid by the skin for his M.D. thesis. Dr Kruger's observations, as far as they refer to children, were made in the wards under the care of one of us at the Royal Hospital for Sick Children. The thesis, for which Dr Kruger was awarded the Syme Surgical Fellowship has, I regret to say, not been published. I may, however, refer to the more important results which Dr Kruger obtained.

Before doing so, however, let me refer shortly to the case which led to the investigations. It was that of an exception-

ally strong and healthy male infant, aged three months, the subject of double talipes-equino-varus. At 1 P.M. on the day previous to that fixed for the operation the lower limbs, after being washed with soap and hot water, and rubbed with ether, were poulticed with bi-carbonate of soda for four hours. A 1 in 60 carbolic poultice (extending up to just below the knees) was then applied for four hours. A weak boracic acid poultice was applied over night. At 9.30 A.M. the following morning the limbs were again washed up, and a 1 in 60 carbolic poultice reapplied. Owing to the admission of an urgent case, the operation on the child had to be postponed. At 1.30 P.M., four hours after the application of the second carbolic poultice, the child became lethargic, and uttered "peculiar choky cries." At 8 P.M. he was pale, semi-comatose, and perspiring freely; pulse small, and very rapid; breathing shallow and frequent; pupils contracted; eyeballs staring and turned up. There were slight spasmodic twitchings of the upper extremity, and the temperature had risen to 102° F. At 9 P.M. the pulse was scarcely perceptible, and there was persistent vomiting. The urine was almost black in colour, and gave, after distillation, a strong reaction of carbolic acid, with bromine water and ferric chloride. The child died comatose at 5 P.M. the following morning, 15½ hours after onset of the symptoms.

At the sectio the liver showed well-marked furrows and grooves not unlike the appearance of a syphilitic liver, but on section the organ appeared to be quite normal. Unfortunately no mention is made of its microscopic appearances. The kidneys gave absolutely no evidence to the naked eye of any catarrhal or inflammatory change. The microscope, however, showed well-marked cloudy swelling and some necrosis of the cells of the tubules. The vessels were markedly congested, and there were small hæmorrhages into the tubules.

Kruger has shown that when a 1 in 40 carbolic poultice is applied to the skin of an adult, 26.5 per cent. of the carbolic acid which enters the system is absorbed in the first two hours, and half that quantity in the next two hours. Relatively more carbolic acid is absorbed by increasing the skin area to which it is applied than by increasing the duration of its application. Moreover, it was shown that if the skin be

previously shaved and scraped with soap and water, more than double the amount of phenol is absorbed within periods of two and four hours respectively than when the skin has had no previous cleansing.

In the case of children, 41.3 per cent. of the total amount of phenol which enters the system is absorbed in the first two hours—in other words, children absorb about 75 per cent. more than adults do during the first two hours. This fact, combined with the greater vulnerability of the child's nervous system, is quite enough to account for the number of cases of carbolic intoxication which have been recorded as having occurred in children. Dr Kruger, in an investigation made on one of us, found that as a result of purifying the hands and forearms with a mixture of green soap, spirit and lysol, followed by 1 in 20 carbolic acid, and of dipping the hands frequently in 1 in 60 carbolic during the operations (occupying together 2½ hours), 355.35 mgrs. of carbolic acid were excreted in the urine during the subsequent 28 hours—the quantity corresponding roughly with what is absorbed when a 1 in 40 carbolic poultice is applied over 72 square inches of skin surface for four hours.

The only signs of injurious action observed in the subjects of Dr Kruger's experiments were carboluria in several instances, and in one case considerable restlessness during the night of the application of the phenol.

In the cases reported by Clement Lucas and Arbuthnot Lane in which carbolic acid coma was induced by the application of carbolic compresses to the skin in children, the chief symptoms were collapse, weak running pulse and quick shallow respiration, sweating, repeated vomiting, and lethargy, passing into coma. In one of the three cases there was also screaming, and this patient "vomited some dark fluid which appeared to be imperfectly digested beef-tea." It is evident, therefore, that, apart from the carboluria, the symptoms of a toxic dose of carbolic acid absorbed by the skin bear a close resemblance to those which are supposed to be due to delayed chloroform poisoning. Moreover, as in the latter, there is the same interval of well-being between the application of the phenol and the onset of the symptoms. The rapidity with which carbolic acid is absorbed by the skin, and the fact that several

hours may elapse before any toxic symptoms manifest themselves, render it important that the surgeon should enquire into the possibility of carbolic poisoning before attributing symptoms after operation, such as we have mentioned above, either to delayed chloroform poisoning, or to some condition associated with the operation itself, or to wound infection.

Since Dr Kruger made these observations, the application in the Edinburgh Children's Hospital of carbolic acid in the form of a poultice-dressing has been discontinued. In the case we are considering, carbolic acid, in the form of a 5 per cent. solution, was one of the substances used to purify the skin the night before the operation, but as it was immediately washed off with sterile water, and an antiseptic dressing applied, the amount of the drug absorbed must have been so slight that carbolic acid poisoning may be definitely excluded.

2. *Fat Embolism.*

The possibility of fat embolism as a cause of death in such cases has suggested itself to many. Watson Cheyne, in criticising Dr Guthrie's original paper, laid stress on this as the probable cause of death in some of the cases, and considered that the absence of a careful examination of the lungs and brain was an unfortunate omission. One reason why the possibility of fat embolism suggested itself in our case was that, during the operation, which consisted, as already stated, in the subperiosteal removal of a wedge of bone from the inner aspect of the lower end of the diaphysis of the femur, about a teaspoonful of yellow fluid fat was seen to exude from the bone. It should be stated, however, that one of us, who is in the habit of performing this operation for knock-knee, has since observed this on several occasions without any untoward result. The circumstance, too, that death occurred quite unexpectedly, and was preceded by some cyanosis, seemed to add to the possibility of fat embolism. A careful search was therefore made for evidence in favour of this view.

It must be admitted that many of the symptoms which were present in our case, and which Guthrie regards as typical of delayed chloroform poisoning, may be seen in severe cases of fat embolism. It is now generally admitted that fat embolism is far from uncommon, and that in mild degrees it is unattended

with symptoms. In the fatal cases, which, on the other hand, are very rare, no difficulty is found in demonstrating microscopically a large amount of fat, at any rate in the lungs. Welsh states that considerably over one-half of the pulmonary capillaries may be blocked by cylinders and drops of oil. In our case fat was present in small amount, many sections from different parts of the lungs being examined before blocked capillaries were found, and though it is stated that in such cases fat in the systemic capillaries may be only slight, in the present case it could not be demonstrated in a single vessel on the aortic side of the circulation.

With the presence of multiple hæmorrhages in the lungs, along with a small amount of fat in a few of the capillaries, it might at first sight appear that we need not go further for an explanation of the death. In order to ascertain the extent of the blocking a large number of sections were made of different parts of both lungs. It is to be noted, however, that the actual emboli were very few in number, and were only seen in minute vessels.

Next, as to the possible source of this fat. The most natural explanation, of course, would be that it came from the bone. Although this cannot be definitely disproved, we are of opinion that there is strong evidence pointing to the liver as the source. As already noted in the description of the morbid histology of the liver, the disintegration of the cells extended to the central zones, and the enormous accumulation of fat in them coupled with the presence of a considerable amount of oil in some of the large hepatic veins, seem to us to account for all the fat present in the lungs. Even admitting the derivation of some of the fat from the bone, we are strongly of opinion that, considering its small amount, its presence must be regarded merely as an incident in the case, and that the fatal termination was not to be attributed to it. We are quite at one with Dr Guthrie in the view that fat embolism is not such a potent cause of death as many believe. It is a remarkable fact that few cases of death from undoubted fat embolism have been recorded in recent years, and we are inclined to believe that many cases which were so recorded in the pre-antiseptic days were in reality cases of septic phlebitis with subsequent pulmonary infarction.

3. *Sepsis.*

As long ago as 1874 Koch, in an article on "Chloroform and its Employment in Surgery," states that, in his opinion, a glance at the literature suffices to show that death in cases of so-called chronic chloroform poisoning is not due to, or hastened by, the chloroform, but is the result of intense septic poisoning. Many recent writers, on the other hand, hold that some deaths which have been attributed to delayed shock or acute sepsis are in reality cases of delayed chloroform poisoning. It must be admitted at once that there is often great difficulty in distinguishing the two conditions on clinical grounds alone, because the symptoms described in connection with delayed chloroform poisoning, viz., severe and persistent vomiting, small and rapid pulse, albuminuria, and occasionally jaundice, restlessness, cerebral excitement, and coma, may be met with also in cases of acute sepsis, for example, in fulminating appendicitis. In our present case, as far as can be judged from the naked-eye appearances, the wound was absolutely healthy. Films from the blood-stained serum in its vicinity showed no great increase of polymorpho-nuclear leucocytes. Further, microscopic sections of the edges of the wound gave no histological or bacteriological evidence of a local infection. The multiple hæmorrhages in the lungs made us suspicious of a septicæmic condition. As has already been mentioned, cultures from the lungs yielded a pure growth of the pneumococcus. It is well known, however, that the pneumococcus may be cultivated from the respiratory mucosa without a pneumococcal infection being necessarily present, and it is interesting to note that in the sections of the lungs stained for bacteria none were found except in the bronchi, and that along with the few pneumococci other bacteria, probably putrefactive, were present.

Histologically, too, there was no evidence of pneumonia. The fact that pneumococci were present is interesting, however as it is known that fat embolism is associated with a pneumonic condition, and quite possibly the vascular disturbance paves the way for infection by pneumococci accidentally present in the upper respiratory vessels. There was no evidence, however, of infection proceeding either from the wound or from

the lungs. It must be remembered, however, that it is sometimes impossible to obtain post-mortem bacteriological evidence of a general septicæmia, a fact which shows the importance of a bacteriological examination of the blood during life. It is to be regretted that this was not done in the present case.

Having excluded carbolic poisoning and fat embolism sufficient to cause death, and sepsis, we are left with chloroform as the most reasonable explanation of the changes in the tissues, changes which are evidently the result of an active protoplasmic poison.

We must admit, however, that we are able to instance cases in which the evidence as to the cause of death was strongly in favour of sepsis, and in which the post-mortem findings, as well as the symptoms, were practically the same as those met with in delayed chloroform poisoning. The best examples of such cases are to be found in deaths after operation for acute peritonitis, for suppurative salpingitis, and for other more or less acute infective conditions within the abdomen.

We shall show microscopical preparations and micro-photographs from the heart, liver, and kidneys of a child, aged six years, who died nine days after an operation for recurrent perityphlitis. The symptoms in this case were indistinguishable from those which are supposed to be characteristic of delayed chloroform poisoning, and the specimens show changes identical with those which some maintain are characteristic of that condition. The child was operated on during a quiescent period. The omentum was thickened and adherent to the cæcum. In separating it to look for the appendix, two foci of necrotic granulation tissue, mixed with a few drops of inspissated pus, were opened into. The appendix was discovered after considerable search: it was only an inch in length, was only slightly thickened, and contained no concretion. As it did not appear to have been responsible for the perityphlytis, and as its position was such that its removal would have been attended with great difficulty, it was deemed advisable to leave it alone.

POST-MORTEM EXAMINATION.—*External Appearances.*—Small ulcers and excoriations over the external surface of the

upper and lower lips; the teeth are all careous, and the surrounding gums thickly studded with small ulcers exuding pus. Ulcerations in the buccal cavity; no appearance of ulceration or congestion in pharynx.

The abdominal wound, which corresponds in situation and direction to the usual incision for appendicectomy, is healed with the exception of the middle portion, which is patent, and communicates with a subcutaneous sinus extending downward towards the lower end of the incision. This sinus does not communicate with the abdominal cavity.

Heart.—No increase in the quantity of pericardial fluid. Several capillary hæmorrhages are scattered over the posterior and upper surfaces of the pericardium and over the base of the heart posteriorly; no pericarditis; no endocarditis. The only noteworthy feature about the heart was that it was rather paler and more friable than normal.

Lungs.—No fluid in sub-pleural sac, and no pleurisy. Both lungs, but especially the right, show, over their several lobes, numerous sub-pleural hæmorrhages varying in size and extent. In the lower lobe of the right lung, hæmorrhages in the substance of the organ. The lungs are œdematous, but there is no pneumonic consolidation. The bronchial glands are not caseous. There is no evidence of diphtheritic or other septic inflammation in the larynx or trachea.

Abdomen.—There is no evidence of recent peritonitis, but in the region of the cæcum the bowels are matted together by fibrous adhesions, which are attached to the parietal peritoneum. A piece of the omentum is found to have been stitched over the front of the cæcum, and the wall of the ileum, about three inches above the ileo-cæcal valve, has been transversely inverted for one-third of its circumference by a continuous Lembert suture. Neither in this region nor in the neighbourhood of the cæcum or appendix has there been any apparent leakage from the bowel, and signs of acute peritonitis are entirely wanting. The appendix, only one inch long, is somewhat thickened and situated on the posterior aspect of the cæcum. There are no tubercular glands in the region of the cæcum or elsewhere in the abdomen.

Liver.—The liver is not enlarged; the surface is very yellow and slightly mottled. On section the portal spaces are

prominent as dark red lines, but the lobules are of a uniformly pale yellow appearance. The central veins are not visibly distended. There are no areas of fæcal necrosis; no gall-stones.

The spleen is not enlarged. Its tissue is firm. The malpighian bodies are prominent.

Kidneys.—The superficial and deep cortex are swollen, and present a uniformly pale yellow appearance.

Alimentary canal.—The pharynx is healthy, but the œsophagus, three-quarters of an inch below the level of the larynx, begins to exhibit intense inflammation of its wall, going on to complete necrosis of the mucous membrane. This condition extends throughout the whole of the remaining portion of the œsophagus, but it apparently ceases at the cardiac orifice of the stomach. The necrosed mucous membrane is swollen, varies in colour from dark brown to black, is soft in consistence and easily detachable, and presents an irregular, shaggy appearance. The sub-mucous coat, the muscular coat, and the surrounding fibrous tissue of the mediastinum are swollen and infiltrated with blood.

The *stomach* is filled with dark coffee-grounds, as is also the upper part of the small intestine. The mucous membrane of the stomach is perfectly healthy, as is that of the small intestine, with the exception of the Peyer's patches towards the middle of the ileum, which are slightly swollen. The mucous membrane of the cæcum, of the ascending, transverse, and descending colon, show scattered areas of hæmorrhage, which become more numerous and extensive as we approach the rectum, where the whole mucous membrane is infiltrated with blood. There is, however, no necrosis or ulceration of the mucous membrane of the large intestine.

Brain shows no gross lesion. Bone marrow; there is no increase in its amount, nor in its vascularity.

Microscopical Appearances.—*Œsophagus.*—The most interesting point about the œsophagus, besides the necrosis of its mucous membrane and the hæmorrhagic inflammatory condition of its wall, is the presence of certain organisms. Superficially in the mucous membrane micrococci are seen, chiefly streptococci, but these appear to be an accidental contamination. The most striking feature is the presence of long and delicate

organisms, which extend more deeply into, and more diffusely throughout the œsophageal wall, and in many situations form definite colonies. This organism is more difficult to stain, and does not retain the stain in Gramm's method. It corresponds in appearance to one of the mouth organisms, and belongs probably to the leptothrix group. This organism is in all probability the causal factor in the production of the local necrosis of the mucous membrane of the œsophagus and the other more generalised toxic changes. The demonstration of this mouth-organism in the œsophagus is of importance in pointing to the probable source of infection, especially as in this case no site of primary infection can be determined in the abdominal cavity.

Examination of rectum.—The mucous membrane of the rectum is widely infiltrated with blood, but not necrosed; no organisms can be demonstrated; the leucocytes, which have emigrated from the blood, are chiefly polymorpho-nuclear leucocytes.

Liver.—In the fresh frozen section stained with sudan there is a very diffuse fatty degeneration of the liver cells (Fig. 3). In many lobules this apparently starts in the central zone around the central vein, where the liver cells in many cases have undergone complete dissolution consequent on a preceding fatty change. In some lobules, however, the intermediate zone shows complete disintegration of the liver cells, exactly analogous to that seen around the central vein in other lobules. Around the portal space only a single layer of liver cells has not suffered in the general fatty degeneration. The fat is in the form of minute granules or large globules, which completely fill the cell. The nuclei of some cells also show the presence of small fat globules. Where the liver cells have been completely disintegrated, that is, in the intermediate zone of some lobules and around the central veins in others, they have been replaced by dilated capillaries. In a paraffin section many of the liver cells around the portal spaces, although they do not show any fatty degeneration, present the appearance of early necrosis. Their protoplasm is hyaline in appearance, and the nuclei of many cells have entirely disappeared.

Kidneys.—In the fresh frozen section stained with sudan, fatty changes are found to be limited to the ascending limbs of the loop of Henle, and to the cells of the straight

tubules of the cortex and medulla. No fat can be demonstrated in the cells of the convoluted tubules. In a paraffin section the secreting cells of the convoluted tubules show granular swelling, and many show partial granular disintegration. The lumina of these tubules are dilated and filled with granular detritus (Fig. 4).

Heart.—Fresh frozen sections stained with sudan show an extremely diffuse and uniform fatty degeneration of its muscle fibres. This affects the muscle cells throughout their entire substance. The fat is in the form of minute granules arranged in definite linear rows. In the paraffin sections the tranverse striation of the muscle cells is seen to be well preserved, and there is no evidence of fragmentation.

Lungs.—The fresh sections fail to demonstrate the presence of fat emboli. Paraffin sections show extensive hæmorrhages into the sub-pleural tissue and into the surrounding alveoli. There is *no* predominance of polymorpho-nuclear leucocytes in these situations. The minute bronchi exhibit capillary bronchitis. No organisms can be demonstrated in the lung.

How, then, are we to account for such an extreme fatty change in the internal organs? Unfortunately it is impossible to say how far the organs were healthy before the operation. Possibly a certain amount of degeneration may have been present in the liver as the result of the long continued absorption from the cæcal region. We are indebted to our colleague, Dr John Thomson, for specimens showing the same extreme fatty change in the livers of two children (to neither of whom had chloroform been administered), who died, the one aged 10 months, from diarrhœa followed by broncho-pneumonia, the other aged 9 months, after an illness of five weeks, from broncho-pneumonia following influenza. It cannot be denied, therefore, that an extreme degree of fatty change in the liver may occur apart altogether from chloroform. And if anything like the same degree were present in our perityphlitis case, it is easy to understand how, as Guthrie suggests, chloroform may act as the "last straw." On the other hand, one of us operated recently on a boy suffering from general suppurative peritonitis secondary to a gangrenous appendix, which lay in contact with the under surface of the liver, the

cæcum not having descended into the right iliac fossa. In this case the liver, which was exposed at the operation, appeared, as far as could be judged by the naked eye, to be perfectly healthy. The abdomen was drained through four openings and the patient made an uninterrupted recovery, so that fortunately we had no opportunity of further investigation of the liver. If the heart and kidneys were as healthy as the liver appeared to be, it is quite possible that the chief explanation of the boy's recovery lies in the fact that the toxines were not sufficiently poisonous to set up degenerative changes, and that had the liver been fatty he would possibly have died.

Turning next to the condition of the heart and kidneys in the child who died after the operation for recurrent perityphlitis, we found that both these organs, especially the heart, showed the same high degree of fatty change as the liver, indeed, one seldom meets with such an extreme and diffuse fatty change in the heart as is seen in this case. It is interesting in this connection to note that in the clinical record of the case special reference is made to the irregularity, as well as to the frequency, of the pulse. It should be mentioned also that there was no albumin in the urine prior to the operation, and that a small amount was present after it. Now, even admitting that there may have been a considerable amount of fatty change in the liver before the operation, it is hardly reasonable to suppose that a child, who, prior to the operation was going about in comparatively good health, could have an equal amount of fatty change in the heart and kidneys. The supposition, therefore, is that such an intense fatty change as these organs presented must have developed after the operation, and, if so, what we want to know is how far the condition was produced by sapræmia—or by septic infection—and how far by chloroform? We are not prepared to give a definite answer to this question without further investigation.

In the case we are now discussing, although the microscope showed that the heart was intensely fatty throughout, yet to the naked eye the organ did not appear to be much affected, and had it not been for our special interest in the subject of this communication it would probably not have been considered

necessary to examine it microscopically. And the same may be said of the kidneys.

The subject appears to us not to have received the attention it deserves, and we think that pathologists would do well to enquire more closely than has hitherto been done into the exact nature and causation of the degenerative changes found in the organs in "surgical" post-mortems.

Every surgeon who has closely watched patients after operations in cases of acute appendicitis—and occasionally also after operations performed during the quiescent period —must have observed the critical condition in which he occasionally finds his patient about 48 hours or so after the operation. The "chloroform sickness" has persisted, the vomited matter is of the dark hæmorrhagic type already referred to, the patient has become rapidly emaciated, the pulse is small, rapid, and often irregular, there is sleeplessness, often extreme restlessness, and the patient is threatened with death from collapse; the urine contains a trace of albumin; there is no complication connected with the wound, no pain, no increase of tenderness, and no distension; nevertheless, the patient is in a very critical condition, and the surgeon fears either general toxæmia, or the commencement of a spreading peritonitis. Should no improvement set in, the surgeon will probably deem it necessary to open up the wound and investigate the deeper parts. Fortunately he may find nothing wrong at the seat of operation, and after adopting certain therapeutic measures, he is relieved to find that during the next 24 hours the patient's condition may have improved to such an extent as to call for no further anxiety.

What is the exact cause of the symptoms in such cases? Are we dealing, though in a milder degree, with the same acute fatty degenerative changes that we can demonstrate as having occurred in the fatal cases, and, if so, what share has the chloroform taken in bringing them about? We should be interested to hear if those surgeons who invariably use ether in such cases have had the same experience.

It is not our intention to discuss or compare the relative merits of chloroform and ether, or to throw further discredit on an already too much abused drug. We are of opinion, however, that every endeavour should be made to arrive at a true

estimate of the harmful after-effects of chloroform. If it be proved that in infective conditions such as we have been considering, chloroform is capable of so adding to the harmful effects already produced by bacterial toxines as to play the rôle of the "last straw," the question of substituting ether must be seriously considered even by those who advocate chloroform.

Vomiting.—All authors who have written on the subject of delayed chloroform poisoning draw attention to the severity of the vomiting. Guthrie says "vomiting was a marked feature in all but one of his cases; it was copious, frequent, and persistent, and the vomited matter sooner or later almost exactly resembled the dregs of beef-tea." Our own experience fully confirms these observations. Indeed, we have been so much impressed by the character of the vomiting that we have thought it worth while to enquire somewhat closely into the frequency and circumstance of its occurrence, with the view of throwing more light, if possible, on its true significance, and of ascertaining how far it may be regarded as a measure of the toxic action of chloroform. For the last twelve months the house surgeons at the Royal Edinburgh Hospital for Sick Children, aided by the ward sister, have recorded the nature and frequency of the vomiting on the temperature charts by means of red dots, one for each act of vomiting, small dots being used for retching or slight vomiting, and large dots when it is more copious. More recently we have indicated the beef-tea-like vomiting by black dots. Taking the last 500 operations performed inside the hospital during the past twelve-months, Dr Dunbar, the last house surgeon, to whom we are indebted for the following statistics, finds that in ten per cent. the vomiting was of a severe type, that is to say, it was repeated from 8 to 46 times, and lasted from 24 hours to 3 days, and in one or two instances even longer. The vomited matter consisted at first of gastric juice largely diluted with mucus; a little later it contained some yellow or green bile, or was mixed with water or undigested milk, when either of these had been given. At a later stage it generally became more copious, and took the form of a dark green watery fluid, while finally, in the most severe cases, amounting to about 2 per cent. of the total, it became of a dark brown colour and flaky, like thick beef-tea.

As regards the nature of the operation in the 50 cases (ten per cent.) of severe vomiting, it was found that 21 were for tuberculous cervical glands, while the remainder were, for the most part, serious operations, and frequently abdominal. Speaking generally, however, it was found that the severity of the vomiting was to a large extent in proportion to the duration and severity of the operation. A study of the vomiting after the operations for the radical cure of hernia affords conformable evidence of this fact. In children this is a comparatively simple operation, and the average duration of the anæsthesia, including its induction, is only twenty minutes. After the 107 operations for hernia performed during the past year, the vomiting was severe in only 6 cases, and of these 3 were attended with complications necessitating a more prolonged anæsthesia. Another point which these statistics seem to bring out is that severe vomiting is more frequent in patients suffering from any form of infective disease—whether acute or chronic—than it is in children who are free from such disease. It was found that 90 per cent. of the cases of severe vomiting were operated on for some infective disease, whereas only 42 per cent. of those in which the vomiting was either absent or very slight, were for infective conditions. This may partly serve to explain the comparative absence of severe vomiting after operation for hernia. Occasionally, however, striking exceptions occur, to wit, the fact that the two cases which we have here recorded as examples of delayed chloroform poisoning were after operations for uncomplicated hernia and genu valgum.

As to the nature of the dark brown fluid, we may take it that it is due to altered blood, derived, in the majority of cases, from the capillaries of the gastric mucous membrane. This symptom, like the others, is, however, common to a variety of conditions, for we find it occurring after various poisons taken by the mouth, in acute yellow atrophy, in icterus gravis, in various septicæmias, amongst which may probably be included the majority of the cases of so-called post-operative hæmatamesis. We have already shown that it may be produced experimentally by the subcutaneous innoculations of chloroform even in small doses, and Ungar has produced severe gastroadenitis in dogs by repeated inhalation of chloroform.

But here, again, we meet with the initial difficulty in distinguishing the hæmorrhagic form of vomiting occurring in delayed chloroform poisoning from that which not infrequently occurs in septicæmia. If the latter complication can be definitely excluded, we are left with chloroform as the only reasonable explanation.

How, then, is the hæmorrhage actually produced? At first it may be supposed that it is the direct mechanical result of the repeated and severe retching, an explanation which, we venture to think, has been too readily accepted. Two strong arguments can be brought against this view, viz.: (1) That hæmorrhagic vomiting is by no means preceded by frequent or violent retching; (2) that very violent retching is often seen in severe bilious attacks without a trace of blood in the vomited matter. By some it has been suggested that the hæmorrhage is the result of an acute gastritis due to the swallowing of a certain amount of chloroform vapour. But as has also been seen from the experiments on rabbits, a local lesion in the gastric mucosa may be due to chloroform absorbed by the blood and excreted into the stomach by the gastric glands. This appears to us to be the most reasonable explanation of the petechial gastric hæmorrhages. We must remember, however, that severe parenchymatous changes in the liver must almost of necessity, by interfering with the circulation, lead to increased hyperæmia of the gastric mucosa, which in its turn favours the occurrence of capillary ecchymosis. This hæmorrhagic form of vomiting is almost invariably associated with grave constitutional disturbances, as evidenced by the collapse, rapid and feeble, and sometimes irregular pulse, restlessness, and frequently also cerebral excitement, a combination of symptoms which point to a general toxic condition due either to organismal infection or to an auto-intoxication set up by the chloroform.

Experimental Observations.

Fourteen experiments have been performed to demonstrate the results of chloroform on the tissues, when induced by subcutaneous injection, and when administered in the ordinary way by inhalation.

The experiments have been performed on rabbits. Of those 14 experiments, only 6 will be referred to at present. The method of subcutaneous injection was adopted in order to demonstrate the full action of the drug on the tissues.

EXPERIMENT 1.—A rabbit weighing 5 lbs. 2 oz. was *injected subcutaneously* with 2 c.c. of pure chloroform. In a few minutes the animal became extremely drowsy, and for some hours after was manifestly under the action of the drug. In the evening it had perfectly recovered, was moving about freely and took food. Next morning the animal looked perfectly well, and ate freely. Twenty-four hours after the injection it weighed 4 lbs. 14 oz. On the evening of the second day it became dull and apathetic, and on the third morning it was manifestly ill. It refused food, and lay in the corner of the cage. At 10 o'clock the same evening the condition was unchanged, and on the following afternoon it was found dead about 75 hours after the injection. Post-mortem same day. Marked diminution in amount of subcutaneous and omental fat. *Stomach* distended with partially digested food. Numerous petechial hæmorrhages in the gastric mucosa.

Heart.—Right side of the heart flabby, distended with dark fluid blood. On section nothing abnormal beyond pallor of the myocardium. Right lung showed patches of broncho-pneumonic consolidation. Left lung nothing abnormal.

Liver markedly fatty, the fatty change being apparently most marked in the central and intermediate zones, the portal tracts and peripheral zones appearing red and congested.

Spleen.—Nothing abnormal.

Kidneys nothing abnormal, beyond pallor.

HISTOLOGY.—*Heart.*—Well-marked fatty degeneration of the myocardium. In places the transverse striation almost completely lost. In places there was also some tendency to transverse segmentation of the fibres. Some of the fibres rather granular and swollen. The nuclei throughout stained well.

Lungs.—Sections from the right lung show an acute broncho-pneumonia. No fat could be demonstrated in the lung capillaries or alveoli.

Liver.—An intense degree of fatty change, especially in the central and intermediate zones. Many of the liver cells

towards the centre of the lobule completely disorganised. The cells were full of minute droplets not tending to coalesce. Further out in the lobule the globules are large. The narrow zone of liver cells at the periphery of the lobule showed no fatty change at all. The nuclei of many of the cells in the central zone stained very badly. No fat was demonstrated in any of the hepatic vessels.

The kidneys.—Both show well-marked cloudy swelling of the convoluted tubules and ascending loops of Henle. Well-marked fatty change in the epithelium of the collecting tubules, and small irregularly scattered foci of fatty change in the epithelium of the ascending loops of Henle, and in a few convoluted tubules. The *glomeruli* throughout show no change, and no fat was demonstrated in any of the vessels.

EXPERIMENT 2.—As a contrast experiment, a rabbit weighing 4 lbs. 12 oz. was injected subcutaneously with 3 c.c. pure ether. The animal suffered no inconvenience beyond the temporary intoxication produced. Next day it had recovered perfectly. It was killed 75 hours after the injection, and naked eye and microscopical examination of the various organs showed nothing abnormal.

EXPERIMENT 3.—Rabbit, weighing 3 lbs. 12 oz., injected with 2 cc. pure chloroform. Recovered completely from the intoxication and on the following morning looked perfectly well. Its weight 24 hours after the injection was 3 lbs. 10 oz. On the following day 3 lbs. 3 oz. and very dull and apathetic. Died during the following night, between 80 and 90 hours after the injection. Post-mortem.—Marked diminution of the subcutaneous, omental and peri-renal fat. A few petechial hæmorrhages in the gastric mucosa. Heart muscle extremely pale. Nothing else abnormal. Lungs showed nothing abnormal.

Liver intensely fatty. The appearances of the liver in experiment 1 being exactly reproduced.

Kidney.—Marked pallor: no evidence to the naked eye of fatty change.

MICROSCOPIC EXAMINATION.—*Heart.*—Fatty change not marked; a few globules in some of the fibres. The muscle fibres swollen, granular and showing some loss of transverse striation. Nuclei stained rather irregularly at places; no transverse segmentation of fibres.

Liver well marked degeneration of cells in central zone. Practically all the cells containing small globules of oil, and the nuclei of many of those cells staining very poorly. As in experiment 1, the extreme outer part of the peripheral zones showed practically no fatty change, but the cells were granular and swollen.

Kidneys. — Only a comparatively slight degree of fatty change in the collecting tubules, with scattered foci in the cortex as in experiment 1. The convoluted tubules, however, show well marked cloudy swelling, amounting in places to an almost complete necrosis.

EXPERIMENT 4.—Rabbit, weighing 4 lbs. 12 oz., injected with 4 c.c. of pure ether.

The animal again suffered no inconvenience beyond the temporary intoxication. It was killed 96 hours after the injection and naked eye and microscopic examination revealed nothing abnormal.

Two experiments have been performed on rabbits with the special view of determining the action of the chloroform on the liver, the drug being administered by inhalation in the ordinary method. As control-observations and in order to determine the condition of the liver at the time of operation the experiments were begun by excising a small piece of liver under ether anæsthesia.

EXPERIMENT 5.—A rabbit weighing 5 lbs. 4 oz., was anæsthetised with ether and a small piece of liver removed. There was practically no hæmorrhage. The abdominal wound was stitched up and covered with collodion. The operation lasted twenty-five minutes. Seven days later the wound was examined and found to be perfectly healthy with good union. The animal was then deeply anæsthetised with chloroform in the usual way and was kept continuously under for about twenty-five minutes. The animal did not take the chloroform well and partial recovery of consciousness was allowed several times. Three hours afterwards the animal had recovered perfectly and next day was quite well. Forty-eight hours after the chloroform-narcosis the animal was killed and a post-mortem at once performed. The liver was found to be slightly paler than normal, and there was some slight mottling, there being a slight yellowish tint towards the centres of the lobules.

The other organs showed nothing abnormal to the naked eye.

Histology.—Liver removed at the first operation. In the majority of the sections the liver cells showed nothing abnormal. Here and there some small oil globules were present in the cells. This was not seen in any particular zone, and nowhere was it marked. Many fields showed absolutely no trace of this fatty change.

Liver removed at post-mortem.—Paraffin and frozen sections were prepared and the latter were specially stained for fat with osmic acid and sudan. In contrast to the appearances before the chloroform, there was now seen to be an extensive fatty change in practically every lobule in the liver. The change was most marked in the intermediate and central zones, a few rows of cells indeed next the portal tracts showing no fat whatever. These latter cells, however, were distinctly granular. The nuclei of the liver cells throughout stained somewhat feebly, not more so, however, in the intermediate and central zones. In those latter situations the liver cells were crowded with small droplets of oil which did not tend to coalesce. The protoplasm of those cells, too, was also very distinctly granular. The condition did not approximate in intensity to the degree of the fatty change seen after the subcutaneous injection of the drug, but the difference appeared to be purely one of degree.

Heart.—Beyond some slight granularity of the muscle fibres, in places, sections showed practically nothing abnormal. In none of the sections could any fat be demonstrated.

Kidney.—Sections showed distinct cloudy swelling of the convoluted tubules, and an occasional convoluted tubule showed very distinct fatty change. In the collecting tubules there was also some distinct fatty change; the nuclei everywhere stained well and the glomeruli showed nothing abnormal.

EXPERIMENT 6.—This experiment was started in the same way. A rabbit, weighing 2 lbs. 5 oz., was anæsthetized under ether, and a small piece of liver removed. The wound was stitched up and chloroform was substituted for the ether, the animal being kept continuously and fairly deeply under for 45 minutes. The animal recovered very slowly from the narcosis, being drowsy and semi-unconscious several hours afterwards. On the next day, however, it had recovered

perfectly. It was killed 48 hours after the original operation.

Post-mortem.—Beyond slight pallor of the liver and kidneys practically nothing abnormal was noticed.

Liver excised at beginning of operation.—Some distinct fatty change was demonstrated in the intermediate and central zones and in a few places here and there in the peripheral zones. The change was nowhere well marked, otherwise the liver showed nothing abnormal.

Liver obtained at post-mortem.—Here a condition similar to that before operation was noted, but the fatty change was very distinctly more marked. This case, however, has not been studied in detail, as the fatty change present before operation seems to vitiate the experiment. It may be stated, however, that no fatty change could be demonstrated in the heart fibres, though in the kidney the fatty change in the collecting tubules was fairly well marked. The convoluted tubules showed cloudy swelling, but no fatty change. An explanation of the fatty condition found in the liver in this case may be found in the fact that the animal was rather small and poorly nourished. In our future experiments we shall endeavour to eliminate this fallacy by using only well grown and well nourished animals; and we shall also endeavour to exclude any fallacy from a possible collection of fat in the liver cells during digestion.

That fatal cases of delayed chloroform poisoning are exceedingly rare may be gathered from the fact that so few cases have been recorded. Even granted that the condition may have been overlooked or misinterpreted, we cannot overlook the fact that surgeons of large experience who recognise the condition state that they have only met with perhaps a single case (Mikulicz). Even in children, in whom the condition is probably more common, our own experience is limited to only three, or at most four cases out of 3000 operations performed by one of us during the past five years in the In-patient Department of the Royal Edinburgh Hospital for Sick Children. The rarity of the condition seems to indicate that there must be some predisposing factor in addition to the chloroform, which, in the light of our present knowledge, must be regarded as the existing cause. This predisposing factor must be looked for in

some already existing morbid condition in the body or in some special idiosyncrasy to the drug. The morbid changes in the liver are so striking, and the fatal issue takes place so soon after the administration of the chloroform, that the idea of a pre-existing disease of the liver has suggested itself to some. So long ago as 1860, Symonds of Oxford drew attention to the danger of chloroform in patients suffering from fatty liver. Guthrie holds a similar view, but insists "that in children the form of fatty liver to which attention has been drawn is altogether peculiar to these cases of fatality following operation under chloroform. He states that "he is familiar with most kinds of fatty liver, but that he has never seen the pale fawn or buff-coloured variety except in such cases as these." His distinction is that in these cases the fatty change affects the entire organ entirely and is not confined to portions of it. With all due deference to Dr Guthrie, one of us, as a result of a considerable post-mortem experience, is of opinion that the same colour and the same diffuse fatty change may be met with in the liver in conditions apart altogether from chloroform. We are quite prepared to admit that a profuse morbid condition of the liver may play some part. Indeed, we may briefly refer to a case in point, viz., that of a boy, aged 7 years, who died from collapse on the fourth day after the administration of chloroform for the purpose of examining a stiff knee-joint, secondary to specific disease of the lower end of the femur. Before the anæsthetic was administered it was observed that the liver was considerably enlarged. The anæsthesia, including its induction, only lasted a quarter of an hour. No incision was made, nor was there any attempt made to forcibly straighten the knee. The patient came well out of the anæsthesia, but was very sick the whole day. On the day following the vomited matter was dark brown and distinctly "*coffee ground*," and this persisted in spite of everything until death. At first the patient was very restless, but subsequently he became more and more collapsed, and died in a semi-comatose condition.

Post-mortem Examination.—

1. *Liver.*—The appearances closely resemble those seen in the patient on whom osteotomy was performed. There is, however, a well-marked fibrous overgrowth of Glisson's capsule,

and there are numerous collections of lymphocyte-like cells here and there in the portal tracts. There is, however, no distinct intercellular cirrhosis. The vessels are thickened throughout. Sections stained with sudan show an extreme degree of fatty change throughout the entire hepatic lobule. The peripheral zone shows well-marked fatty infiltration, many of the cells being entirely filled with large globules of fat. The nuclei are displaced, but stain perfectly well. In the intermediate and central zones the fat is in much smaller droplets and the cells are not increased in size, some indeed are markedly diminished; the nuclei are again well stained. There is some dilatation of the capillaries round the central venule.

2. *Kidney.*—Unfortunately, only a paraffin section was available for examination, and the fat of course cannot be satisfactorily demonstrated. The cells of the convoluted tubules and the looped tubules of Henle showed well-marked cloudy swelling. The vacuolated appearance of the cells strongly suggested a fatty change. For purposes of comparison sections of the kidney in the osteotomy case were prepared in an exactly similar manner, and the appearances were almost identical with those seen in the present case.

We do not think that Dr Guthrie has brought forward sufficient evidence that the fatty change he describes is the essential predisposing factor, the chloroform only acting as the "last straw." On the contrary, we are by no means convinced that the fatty change may not be entirely due to the chloroform acting on a previously healthy liver. Indeed, experimental evidence seems to give strong support to this possibility. Moreover, while the changes in the liver are so striking, it must not be forgotten that other organs give evidence of a general toxic poisoning, and it seems hardly justifiable therefore to attribute the fatal result to hepatic insufficiency.

In addition to a pre-existing morbid condition of the liver, other authors have sought for the explanation in organic disease of the other viscera. Thus, disease of the kidneys, vascular system, etc., have all been regarded as possible pre-existing factors. While it is impossible to deny that these may play some part, it is well known that subjects of grave organic disease often stand chloroform so well that we cannot

regard the pre-existing lesions as essential causal factors. Again, it must be remembered that in some of the fatal cases organic disease can be definitely excluded, so that we are driven to the other possibility, viz., that the essential predisposing factor is to be sought for rather in some special idiosyncrasy to the action of the drug.

It will, we think, be admitted that various degrees of fatty change in the liver may occur without giving rise to associated signs and symptoms which can be recognised clinically. In patients the subject of chronic disease, *e.g.* tuberculosis, a certain amount of fatty change is frequently present in the liver, but we are unwilling to admit that anything like the degree of fatty change found in the liver at the post-mortem in cases of delayed chloroform poisoning is at all likely to have been present in patients who, apart from such affections as uncomplicated hernia, genu valgum, etc., appear to be perfectly healthy.

It is more than probable also that idiosyncrasy plays an important part in many of the fatalities during the administration of the chloroform. Admitting this idiosyncrasy, however, it is worth while considering the manner in which chloroform brings about a fatal issue in the delayed deaths.

As we have seen, some would attribute this to a direct destructive action on the red blood-corpuscles leading to deficient oxidation, which in its turn might explain the increased deposit of fat in the organs. There does not seem to be sufficient evidence in support of this view. The most reasonable explanation of the condition is to be sought for in some intoxication, though the exact manner in which this is brought about is still obscure. The experimental results on the effect of chloroform clearly show that it is an intense protoplasmic poison capable of producing changes in the organs sufficient to interfere seriously with their function. We have seen that the most prominent histological feature is a fatty change involving especially the liver, kidneys and heart, and probably also elsewhere. It is difficult to say, however, whether the fatty change in the liver is to be regarded as of the nature of a degeneration or an infiltration. Undoubtedly the appearances in many cases are those of the local formation of fat from the cell protoplasm, but recent researches have shown that many of the

conditions formerly described as degenerations are really of the nature of infiltrations, the fat being derived from other parts of the body and elaborated from the blood by the liver cells.

The symptoms in cases of delayed chloroform poisoning closely resemble those met with in other auto-intoxications, such, for example, as diabetic coma, a condition now generally attributed to production of certain acids, acido-acetic acid, etc. It is worthy of note that many observers have detected a great increase of acetone in the urine after chloroform anæsthesia, and it seems reasonable to suppose that very possibly the blood may contain some of the poisonous precursors of acetone, and that in certain cases these are produced in so great an amount as to determine a condition analogous to diabetic coma. That there is a possible relationship is further suggested by the very striking diminution of fatty tissue throughout the body in rabbits poisoned by the subcutaneous injection of chloroform. It must be remembered, however, that the same rapid emaciation is also observed in animals poisoned by bacterial toxines.

The most recent physiological researches on the source of acetone in the body have disproved the old idea that it derived from either proteids or carbohydrates, and show that fat is its true source. We should like it understood, however, that we regard the analogy delayed chloroform poisoning and diabetic coma mer working hypothesis, and we think the question is wc further investigation. If an excessive acetonuria be to exist in delayed chloroform poisoning, we might h find in it the means of recognising milder degrees intoxication, and possibly also of differentiating the co from such post-operative complications as delayed sepsis, etc.

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Plates illustrating Mr Stiles' and Dr Stuart Macdonald's paper in the August Journal.

Kindly note an erratum in the text. Figs. 3 and 4 refer to Experiment 1 in Tab.

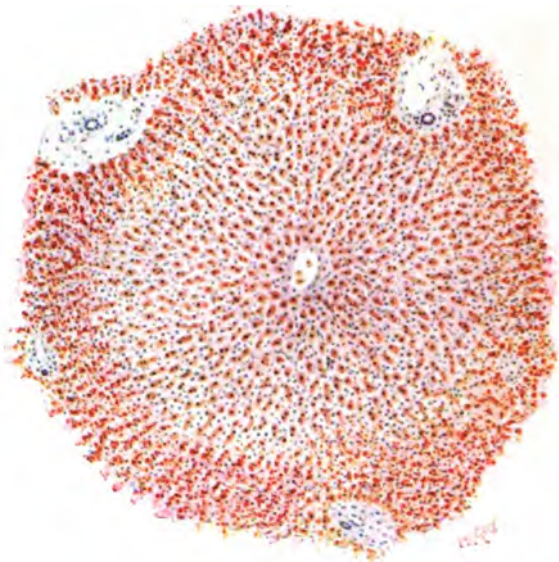


Fig. 1. Hæmatin and Sudan 3. ×80.

Fig. 2. Hæmatin and Sudan 3. ×250.

PLATE VI.--TO ILLUSTRATE MR. STILES AND DR. STUART M'DONALD'S ARTICLE.

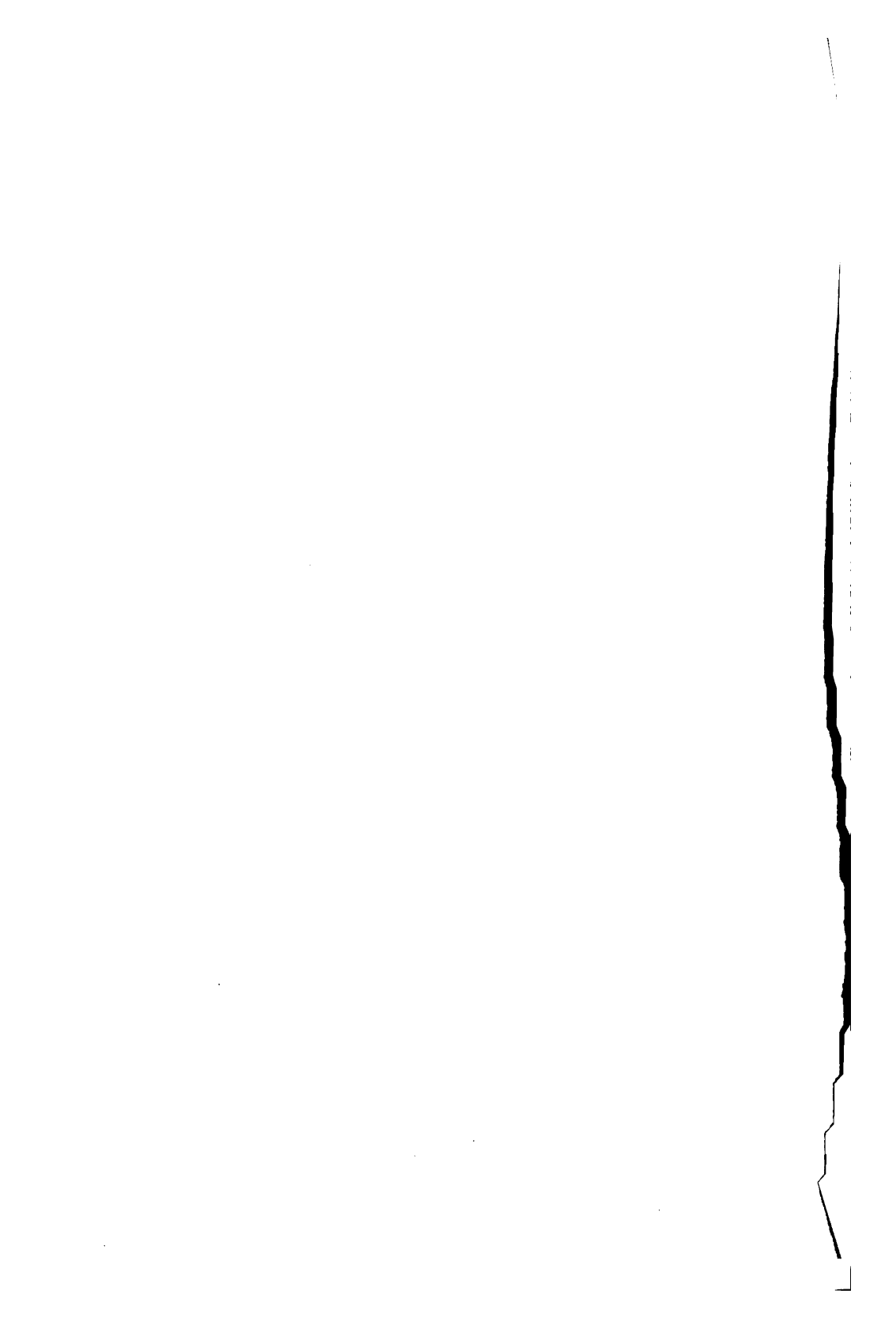
Liver and Kidney from patient Jane R.

Fig. 3. Hæmatin and Sudan 3. ×80.

Fig. 4. Hæmatin and Eosin. ×250.

PLATE VII.—TO ILLUSTRATE MR. STILES AND DR. STUART M'DONALD'S ARTICLE.

Liver and Kidney of Rabbit (Experiment I.)



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Clinical Record

HYDRO-SALPINX WITH TORSION OF THE TUBE

By A. LOUISE M'ILROY, M.D., Ch.B. (Glas.), L.M. (Rotunda)

THE following case is of interest owing to the complete torsion of the tube in several portions, and it is owing to the kindness of Dr J. K. Kelly, Gynæcologist to the Glasgow Royal Infirmary, that I am enabled to publish it. The patient, aged 43, married 23 years, v-para, last child eleven months before admission, was admitted into the Royal Infirmary on 31st August 1903. Menstruation began at 14, four weeks type, lasting five to seven days, accompanied by pain on first two days of flow.

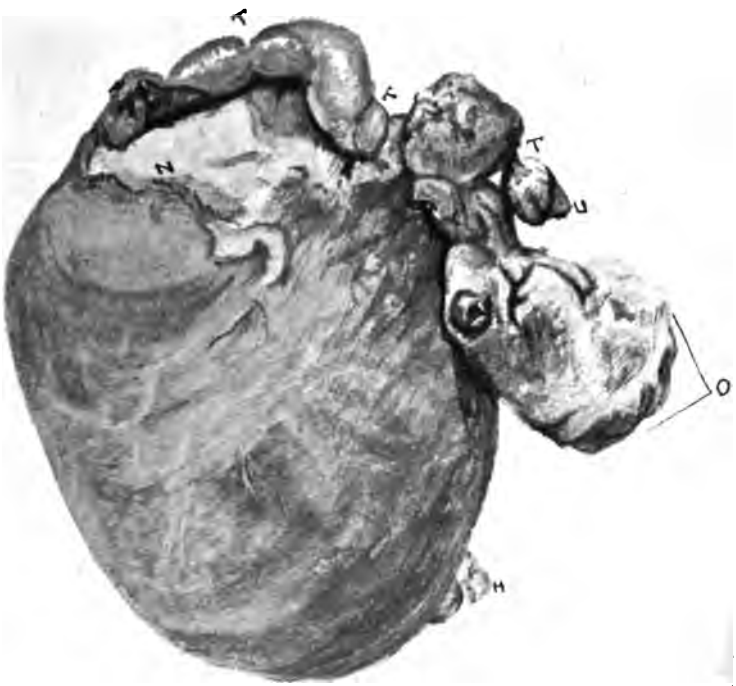
During her last pregnancy had pain in left hypogastric region, and during labour she felt as if something obstructed delivery. The labour and puerperium, however, were normal. On getting out of bed she had pressure symptoms in bladder and rectum, present till admission. The patient looks fairly healthy. On pelvic examination some resistance is felt in left side of pelvis to deep pressure. *P.V.* a firm, cystic, rounded mass is felt posterior to uterus, tender to firm pressure, sound passes 2¾ inches in normal direction.

At the subsequent operation the left tube was removed, being adherent to surrounding organs. The patient made a good recovery.

Pathological Description of the Specimen.

The accompanying drawing shows the condition present. The specimen is composed of a large cyst formed by the dilatation of the outer end of left Fallopian tube. The cyst is about the size of a large orange, and contains blood-stained fluid. It is semi-transparent, and has fairly thick walls. Along its upper surface and connected by the meso-salpinx is the tortuous inner portion of the tube, but its outer connection with the cyst is not well defined owing to an area of necrosis (N). The cyst is adherent to the tube about its middle third by a band of peritoneum; at this portion the tube has undergone complete torsion (T). Further along the walls are thickened until about one-fourth inch from uterine end, where the tube again has become completely twisted and its lumen occluded. A similar torsion has occurred about an inch from the cyst; thus the specimen shows three complete torsions.

At the lower end of the tumour is a small cyst, probably the



T = Torsion. U = Uterine end. O = Ovary.
H = Hydatid. N = Necrotic area.

PLATE VIII.—TO ILLUSTRATE DR M'ILROY'S CASE.

hydatid of Morqaqui (H), showing the presence of the fimbriated end. The ovary which is non-adherent shows the presence of several small hæmorrhagic cysts. After hardening in weak formalin an incision was made into the cyst walls. The contents were semi-fluid—chocolate coloured, with flakes of fibrin. The interior of the cyst shows flattened ridges resembling the plicæ of the tube. In some portions of the wall there is a thin layer of fibrin deposit.

Microscopical examination of the specimen shows the uterine part of the tube to be filled with blood clot, with almost complete obliteration of the folds. The muscular wall is thinned and contains large blood-vessels. There is very little differentiation of tissue to be made out on examination of the dilated portion, the sections showing dense connective tissue, with some round-celled infiltration. No evidence of pregnancy found anywhere in the specimen.

This specimen seems almost unique, the multiple torsions of the tube with the outer dilated portion completely shut off. The condition has probably been one of hydro-salpinx in the outer third, then torsion has taken place owing to its dependent position; the pressure of surrounding organs—perhaps at the time of labour—causing necrosis of tissue, with effusion of blood into the tube lumen. My impression on first examination was that it was an example of a small unilocular cyst of the broad ligament, but on closer investigation I found the parovarium quite distinctly separate. The ovary, as shown in drawing, is also free. The hydatid of Morqaqui, the folds in the cyst interior, point to the outer portion of the Fallopian tube as being the origin of the condition. The presence of hæmorrhage suggests a previous tubal pregnancy, but there is no evidence of this in the microscopical examination. The patient's symptoms date from the last labour; thus it was probably at that time when torsion took place.

There is no evidence of the cyst having had its origin in an accessory tube.

It is interesting to observe the almost normal size of the inner portion of the tube, in comparison with the enormous dilatation of the outer portion.

TRANS-ATLANTIC OBSTETRICS

A CRITICAL REVIEW OF AMERICAN TEXT-BOOKS

By WM. STEPHENSON, M.D., F.R.C.S.E.,
Professor of Midwifery in the University of Aberdeen

I **An American Text-Book of Obstetrics.** Edited by NORRIS and DICKINSON. Pp. 1009, with nearly 900 colored and half-tone illustrations. The Rebman Publishing Co. 1897.

II. **The Practice of Obstetrics.** By American Authors. Pp. 768, illustrated with 441 engravings, 34 of which are in colors, and 22 colored plates. Edited by CHARLES JEWETT, M.D. Henry Kimpton. 1899.

III. **A Text-Book of Obstetrics.** By BARTON COOKE HIRST, M.D. Pp. 846, with 653 illustrations. W. B. Saunders & Co. 1900.

IV. **Modern Obstetrics, General and Operative.** By W. A. NEWMAN DORLAND, A.M., M.D. Pp. 797, with 201 illustrations. W. B. Saunders & Co. 1901.

V. **The Practice of Obstetrics.** By J. CLIFTON EDGAR. Pp. 1111, with 1221 illustrations, many of which are printed in colors. Rebman, Ltd. 1903.

VI. **Obstetrics, a Text-Book for the use of Students and Practitioners.** By J. WHITRIDGE WILLIAMS. Pp. 845, with 8 coloured plates and 630 illustrations in the text. D. Appleton & Co. 1903.

VII. **A Text-Book of Obstetrics.** By J. CLARENCE WEBSTER, M.D. (Edin.). Pp. 767, 383 illustrations, 23 of them in colors. W. B. Saunders & Co. 1903.

NOT infrequently one hears the opinion expressed that modern text-books of midwifery are unsatisfactory. Students and practitioners alike complain. The smaller works are quite insufficient; the larger give too much of what is rarely needed, too little of what is often required. The essential ground-work of obstetrics is so interleaved with details of purely scientific nature, that the student's mind is embarrassed by the defective sense of proportion shown in many of the works; there is a lack of perspective. The busy practitioner turns to them and finds theories ancient and modern, much statistical matter, many diverse opinions gathered from home and foreign literature, but not the guidance he is in need of—the matured opinion of the writer or a judicial summing up of the evidence.

Why should the endeavour be so frequently made to compress the whole subject of midwifery into one volume, to be comprehensive and pedantic, rather than didactic and instructive? Why are there so few obstetric works other than text-books? We have too many of the latter.

It is a mistake to try to meet "the needs both of the scientific student and of the active practitioner" in one volume. When the ground-work has already been laid, when by practice he has become conscious of his deficiencies, and his interest stimulates his desire for further knowledge, the practitioner needs less rigid systematising, less compression in the treatment of practical matter, a broader, fuller handling of the questions, something more after the style of a post-graduate than an undergraduate course.

From a student's point of view, a text-book should be such as he can read regularly and intelligently through, the subject-matter arranged as in a systematic course of lectures. In some works the arrangement in this respect is very faulty; subjects such as abortion, ectopic gestation, cystic mole, and the like, are dealt with before the course and management of normal labour. By aid of the index a practitioner may find what he is in search of; the student should have the order of study laid down for him.

America, in recent years, has been prolific in text-books of obstetrics. The old term midwifery is out of fashion. The nationality of these works can readily be recognised. They are excellently printed, well bound, profusely illustrated, weighty to hold, and heavy to read. It is not in these respects, however, that they differ widely from the classic works of older writers. Year by year they are becoming more and more overweighted with matter of purely scientific interest—valuable in itself, but of little positive use to the student or busy practitioner. We miss the graphic description, the literary restraint and the matured opinions of the old masters. The zeal for science is great, so great that it is difficult at times to repress the feeling that much is introduced for rivalry and show.

The rivalry is great in the display of illustrations, the number of which is duly intimated on the title-page. The lowest is 201, five works have over 600, and the record stands at 1221, "many of which are printed in colors." This is a style of window dressing not to be commended.

Some of the illustrations are trivial in the extreme—"how to tie" and "how to cut the cord," "how to notch the nail of the finger for rupturing the membranes," "a tin of commercial carbonate of soda and another of chloride of lime" for use in rendering the hands and forearms aseptic ("from a photograph").

Microphotographs are favourites. Those of Williams are very fine and are being reproduced by others: as a rule, however, such illustrations are not successful or instructive, but they look learned. It requires much experience to interpret them;

a schematic drawing will often give a clearer and more comprehensive conception than the reproduction of one or two microscopic slides.

The application of forceps can be illustrated better by diagrams than by the realistic drawings so freely supplied, *from photographs!* with more exposure of the body than is necessary. What scientific value can there be, what practical purpose is served, by presenting in processional form, a naked female, merely to show the projection of the abdomen in the successive months of pregnancy?

It is not the "wealth of illustration" that we complain of, but the *kind*; it is not the *nude* we object to, but the *needless display of it*, aggravated when it is the product of the camera. In a recent text-book (vii.) are two figures, the one "Walcher's position," the other a full front view of a "patient placed on edge of table or bed" in semi-lithotomy position, without a stitch of clothes on either. Would the author display these on a diagram board before a class of students? Take also the figure, reproduced in several works, to illustrate the Credé method of expressing the placenta. Does the indelicate display of the parts, "photographed from nature," teach anything that could not be imparted more clearly in words, and certainly with more refinement. Refinement in verbal expression is an essential; why should it be otherwise in drawings?

Accuracy in detail should surely be aimed at. How long are we to have copied the old fanciful figures of the uterine musculature? Did anyone ever see such fibres, either in the puerperal or non-gravid state? The drawing in Webster's work (Fig. 98) of "Female pelvis *viewed in axis of brim*" is not correct. The axis of the brim prolonged passes through the coccyx, here it would pass far in front of it. In the same work, and in other two, is to be found a carefully executed drawing with the following description: "perforation of the head with Simpson's perforator, right hand is grasping the handles. The tips should not be separated until after they have entered the *fontanel*" (*sic*). Now be it noted that the instrument is not locked, as it should be when perforating, and the grasp of the handles is such that, unlocked, the operator can hardly fail to "separate the tips" before perforation is effected. An Edinburgh graduate should know better how to use the instrument.

How far should the subject of Embryology be treated in text-books of midwifery? Williams answers this question when he says: "In the present work we shall not attempt to trace the development of the ovum through all its changes, but shall consider only those changes which are directly concerned

in the formation of the fœtal membranes and the placenta. For detailed information concerning the general development of the embryo, the student is referred to the standard works upon embryology." This movement is in the right direction, and might be carried further; most of the works are overweighted with details that have no relation to midwifery.

The recent work of Peters, Leopold, Webster and others, is of the highest scientific value, but a detailed account of their work, as given in the more recent text-books, makes tough reading for anyone who has not had previous knowledge of the subject; and many give up the task. No one is better qualified to write on placentation than Professor Clarence Webster, but in his text-book the subject is handled in the same manner as in his well-known treatise; excellent in the treatise, but too obstruse and minute in a work for students and practitioners. What is wanted is a general yet accurate view of the subject, drawn in broad outline, all essential facts given; those of lesser importance, or still doubtful, left out, or dealt with in an appendix. It would be well throughout these works generally, were the non-essential scientific subjects so treated instead of being incorporated in the text.

Reviewing the modern practice of midwifery as taught in these books, it is evident that the writers overlook the differences between the facilities of maternity institutions and the exigencies of general practice. They write as specialists whose experience has been gained in hospitals, and have never known the high time pressure under which the busy practitioner works single-handed. Till teachers simplify their methods, become more practically sensible, and less finical and impossible, their writing will be in vain.

Undoubtedly in the past too little attention was given to the condition of patients in the later months of pregnancy, but indifference is not likely to be removed by inculcating that in all cases "a regular monthly examination of the woman's urine should be made during the first seven months of pregnancy and afterwards once a week or fortnight." Also that "after the mid-term of pregnancy the physician should at times carer fully examine the abdomen and pelvis externally, and once or twice should make a thorough bimanual examination." Another writer says, "from four to six weeks before the expected date of confinement a careful examination is indispensable . . . the physician should look upon the making of it as a bounden duty."

Take, again, the outfit a physician is recommended to carry along with him — too lengthy to quote here — but from "a bobbin for tying the cord" to a "Kelly obstetrical pad and

a leg holder" (Williams). Consider, too, the complicated antiseptic and aseptic precautions laid down as incumbent on doctor and nurse, especially all Webster considers indispensable, and no wonder some men scoff at sterilisation. Obstetric asepsis will never be the rule of practice if its attainment is dependent upon shaving the genitals and the use of boiled rubber gloves in examinations or operations, or taking twenty minutes to cleanse the hand each time of visiting a patient in labour.

Strange it may seem, yet a little consideration will show that in modern text-books the subject most inadequately dealt with is that of the management of ordinary labour, especially in the first stage. The normal course is described, but not the slight deviations therefrom that retard labour, such as nature eventually is able to overcome, but only by an unnecessary expenditure of energy—with its attendant risks.

The venerable Hodge taught it was the duty of the medical attendant "to ascertain accurately the progress of the labour, and to be ready to obviate any irregularity which may occur, or to facilitate any of the natural changes which should successively ensue." His successors view matters differently, as a few quotations will show.

"Nothing is more to be deprecated than the routine vaginal examination of parturient women" (Webster). "Usually all that is necessary to know may be determined by external methods" (*Am. T. B.*). "All that can be gained therefrom is information concerning the degree of dilatation of the cervix. On this point one can usually form a fairly accurate idea from the behaviour of the patient and the extent to which the head has descended into the pelvis, which can usually be determined by external palpation" (Williams). "All manipulations within the passages for the purpose of accelerating the labour in normal cases are to be scrupulously avoided"; "when the bag of membranes does not burst spontaneously by the time it *reaches the pelvic floor*, it should be ruptured by the obstetrician" (*Am. T. B.*). "In the case of a primipara such interference is not justifiable," and again, "the membranes are not to be ruptured *during a pain*" (Hirst). "As long as the os is undilated and the membranes unruptured there is no danger to the mother or to the child, and the accoucheur should content himself with inaction" (Dorland).

It is in this "inaction" and indifference to ascertain accurately the progress of labour wherein danger lies. Nature, no doubt, may be able eventually to overcome the difficulty, but is it of no importance to save the patient hours, it may be, of unnecessary suffering and the risks of uterine fatigue, when this

can be done by simple and safe means? Conditions are often met with in ordinary labour where we may with advantage rupture the membranes *before* full dilatation of the os. There are means of aiding dilatation other than by hydrostatic bags and mechanical contrivances, but they are discarded because one cannot sterilise hands as one can instruments, by boiling.

The size of the os is the only measure referred to by writers whereby to judge of the progress of the first stage. What of the condition, not uncommon in primipara, where the uterine changes during the first stage may have advanced to a dangerous degree and yet the os will not admit a finger? Oh no, there is no danger so long as the os is not fully dilated and the membranes entire!

"If the first stage is unduly retarded, a careful digital exploration by the vagina may be needed to learn the cause" (*Am. T. B.*). What is the meaning of "unduly retarded"? is it a question of time alone, and how is tardy dilatation to be recognised without examination from time to time? The cause of delay may be defective action of the bag of waters, and when this is recognised, the best means of facilitating labour may be to rupture the membranes. It is not the size of the os, nor the duration of labour alone, that is the criterion, but other things the books do not include.

There are, however, valuable features in these works, but they belong in style more to the special treatise or the encyclopædia than the text-book. They are storehouses of past and present obstetric work and opinion, useful to the scientific student, especially when full references to the original papers are given.

Yet withal, the result is disappointing; there remains a feeling of unnecessary effort, and a want of vitality. They are written too much like books on anatomy, each part carefully dissected and minutely described, dismembered, dry, devitalised. The atmosphere is that of a physiological and pathological museum, with little of the broad look, the energising influence of clinical work.

Meetings of Societies

Edinburgh Medico-Chirurgical Society

THE eleventh meeting of the session was held on Wednesday, 6th July 1904—Professor John Chiene, C.B., President, in the chair.

Mr Stiles described a case operated on for a cyst of the

mesentery. The cyst wall was found to consist of fibrous tissue, covered by peritoneum and lined by endothelium.

Dr Edwin Bramwell showed two cases: (1) A watch-maker, aged 34, with paralysis of accommodation in the right eye. Neither pupil reacted to light; the left contracted fairly well, the right not at all, on accommodation. Very careful examination failed to elicit any further evidence of disease. The patient had syphilis six years previously; for several years past he had been using the watchmaker's eyeglass for six hours daily, and always with the right eye. The case is of interest in connection with Edinger's theory of the etiology of tabes. Edinger supposes that syphilis acts as a predisposing cause, superadded excessive function determining the special neurons to be affected in different cases. (2) A hammerman, aged 24, suffering from chronic anterior poliomyelitis, affecting the right biceps and supinator longus, the right triceps, the trapezius and latissimus dorsi on both sides, and the rhomboids on the left. There was no sensory alteration and no evidence of involvement of the pyramidal tract. Fibrillary tremors had been noticed.

Dr W. Allan Jamieson exhibited: (1) A case of hypertrophic acne rosacea after treatment. (2) A case of lupus of the hard palate, nose and gums of five years' duration. The disease of the hard palate had completely disappeared under treatment by radium.

Mr Caird showed three cases: (1) A patient after removal of a large renal tumour (nephroma) from the right kidney. There was a history of hæmaturia seven years previously; the hæmorrhage started afresh four years ago, and had since recurred monthly. At the operation the tumour was found to pass almost up to the diaphragm. (2) A woman, aged 54 years, after removal of a large carcinoma of the transverse colon, under local anæsthesia. (3) A case of coxa vara in a boy seven years of age. The patient began to limp after the age of five. Abduction could not be performed to any great extent; and by Röntgen rays, the necks of the femora were seen to be almost at right angles to the shafts of the bones.

Mr Dowden exhibited: (1) A patient, aged 60, two years after operations for epithelioma of the floor of the mouth. (2) A patient two years after operation for epithelioma of the lip. Mr Dowden also showed for Mr Cotterill: (1) A patient with a large hepatic tumour. Five years previously a portion of the tumour had been removed by operation, but microscopic examination of the specimen had not enabled a definite diagnosis to be made. (2) A boy with congenital deformity of the right ear, of the jaw, face, and other parts, together with spina bifida and rickets.

Dr R. A. Fleming showed a female patient suffering from peculiar spasmodic cough The condition had developed in 1901, with a sensation of suffocation on laughing. The paroxysmal attack consisted in, firstly, a short inspiration, followed by a long expiratory cough accompanied by a "wheeze," these two phases being repeated two or more times. The patient had four or five such attacks daily, and they were intensified by fright, etc. High frequency currents have resulted in marked improvement. The attacks were probably due to adductor spasm.

Mr Scot Skirving exhibited a girl, aged 15, showing a peculiar arrest of development of the fourth metacarpal bone of each hand. The condition was more pronounced in the right hand. The local pain had been relieved by Bier's congestion treatment.

The following card specimens were shown :—

By Dr W. S. Sym: Ophthalmic instruments.

By Mr Miles: 1. Portion of stomach showing gastric ulcer on anterior wall which had perforated, and a second ulcer on posterior wall on the point of perforating. 2. A series of vermiform appendices (25) illustrative of the morbid anatomy of appendicitis.

By Mr E. S. Carmichael: Dermoid ovarian tumour, with contents, removed from a married woman between 35 and 40.

By Mr Wallace: 1. Appendix from an acute fulminating case of appendicitis. 2. Malign annular stricture of descending colon, with adherent loop of small intestine. Enterectomy. Recovery.

By Dr Garland: 1. Punctured (poker) wound of parietal bone of female skull (homicidal). 2. Traumatic rupture of small intestine (male) without external injury, and sustained in course of street brawl.

By Mr Stiles: Cæcum and lower end of ileum removed by operation for a carcinoma originating at orifice of appendix.

By Dr Allan Jamieson: 1. Sections from case of mycosis fungoides before treatment by X-rays, showing *disappearance* of elastic fibres, and, after treatment, showing their *restoration.* 2. Sections from case of angio-myoma of face, showing *displacement* of elastic fibres.

By Mr Caird: 1. Nephroma from patient shown at the meeting. 2. Tumour of colon from patient shown at the meeting. 3. Skiagram of patient with coxa vara.

By Mr Cotterill: Papillary fringes removed from a case of osteo-arthritis of knee-joint.

By Mr Cathcart: 1. Multiple adenomata from both breasts. 2. M'Donald's model illustrating hip-joint disease.

Sir Thomas R. Fraser read a paper on a case of complete transposition of the viscera with cerebral tumour and other pathological conditions. The patient, a man aged 24, was admitted to hospital in July 1902, suffering from pyuria and headache. The latter symptom had recurred at regular intervals for four years previously. In 1895, the case had been recorded by Dr Jas. Paton Boyd in the *Glasgow Medical Journal.*

The patient subsequently developed atrophy of both discs, and nystagmus. Memory was much impaired. The attacks of pain usually lasted ten minutes. Thereafter he fell asleep; and wakened dull; whilst if the pain were very severe, it was associated with vomiting. No therapeutic influence had been exerted by phenacetin, or sodium nitrite. The details of the complete transposition of the viscera, fully ascertained during life, were verified at the post-mortem examination. There was also detected a pear-shaped tumour, the size of a marble, the narrow end of which projected into the foramen of Monro, thus causing ventricular dilatation. It was a soft cystic tumour, a rare variety of cerebral tumour. The literature of heterotaxy, or transposition of the viscera, was referred to, and it was pointed out that the etiology was still unsolved.

Dr Edwin Bramwell referred to the case recorded by Collier and Batten in *Brain.* In that case the tumour likewise blocked the foramen of Monro.

Dr W. S. Sym read a paper on metastatic gonorrhœal conjunctivitis. It was pointed out that there is a form of conjunctivitis occurring in persons suffering from gonorrhœa, but not due to direct infection. The clinical features and history seem to prove this. The conjunctivitis affects both eyes, is never violent, there is little swelling of the lids, the discharge is thin, being mucoid or muco-purulent and containing few gonococci. These features were illustrated by two cases. In the first case there was a history of gonorrhœa three months previously. The conjunctivitis was associated with a small corneal ulcer, and with affection of several joints. Under treatment with protargol and corrosive lotion, there was speedy recovery. In the second case, gonorrhœa had been acquired four weeks previously. Several joints were affected at the same time as the conjunctivæ. Very few gonococci were found in the conjunctival discharge. These were the first cases of this rare condition which Dr Sym had met with. Cases were first recorded in 1899, but the condition still received no mention in many text-books. Many investigators have found no gonococci in these cases, and Axenfeld has suggested that the conjunctivitis was due to a toxin rather than to the gonococcus itself.

Mr Wallace said that metastic gonorrhœal conjunctivitis had been recognised for some time past by those dealing specially with gonorrhœa. The conjunctivitis is usually associated with gonorrhœal rheumatism, and both are probably toxæmic in origin.

Dr A. Logan Turner read a paper on the operative treatment of chronic suppuration in the frontal sinus. One of the difficulties which surrounds the question of operative interference in this region is the risk of causing considerable disfigurement. While various operations have been devised, there are two principles underlying all the methods employed, namely—(*a*) opening and draining the cavity with preservation of the sinus (Ogston-Luc); (*b*) obliteration of the sinus (Kuhnt). The disadvantages of the Ogston-Luc operation, rendering it likely to be a failure, are firstly, anatomical—namely, the large size of the sinus, recesses, vertical partitions within the sinus, and irregularity of the sinus itself; and, secondly, there is the possibility of suppuration in the associated ethmoidal cells, together with the fact that an ethmoidal cell not infrequently lies in the orbital roof. In 107 cases out of 172, the ethmoidal cells were also affected. The operation is not devoid of risk. Dr Turner had collected from the literature 24 cases—8 of these being hitherto unpublished—in which post-operative fatality was recorded. This mode of operation was shown to effect a cure in 58 per cent. of cases. Kuhnt's operation results in cure in 98 per cent. of cases, but there is a certain amount of subsequent deformity, whereas after the Ogston-Luc procedure there is practically no deformity. If in Kuhnt's operation one does not remove the floor of the frontal sinus, one may miss the affected ethmoidal cells.

Certain operative procedures may combine the advantages of both operations, and eliminate as far as possible their disadvantages. Such procedures are osteo-plastic resection of the anterior osseous wall of the sinus—the principle of the Killian operation. Killian leaves the orbital margin as a bridge, but otherwise removes the whole floor of the frontal sinus. The orbital arch is thus preserved and the contour of the forehead preserved.

The paper was discussed by Dr Sym and Dr M'Bride.

Edinburgh Obstetrical Society

THE eighth (summer) conjoint meeting with Glasgow Obstetrical Society was held in the Caledonian Station Hotel on the 13th July—Dr N. T. Brewis, President, in the chair. A large number

of gentlemen were present, and a very successful meeting was held.

The business took the form of a discussion on "The Use and Abuse of the Midwifery Forceps," and was opened by a paper contributed by Professor Kynoch of Dundee. He said that no more opportune theme could have been chosen, threatened as we were by the nation being deprived of five hundred children per week, and while the declining birth-rate was one of the problems of the day. It was urged on the one hand that the use of the forceps by the general practitioner was too long delayed, so causing a loss of fœtal life. On the other hand, the forceps had been described as the bloodiest of all obstetric operations, and as being responsible for many injuries which required subsequent treatment at the hand of the gynæcologist.

Professor Kynoch thought that it was unnecessary at this time to contrast for purposes of discussion the ordinary double curved forceps with those constructed to fulfil the function of axis traction. It was almost impossible to lay down a hard and fast rule as to the indications and contra-indications for the forceps. Each case required to be considered on its own merits, and to a great extent this depended on individual judgment. It was one of the truest maxims in midwifery that as long as the membranes were entire, and the liquor amnii present, no danger would accrue to mother or child by the continuation of labour. Rare conditions, as eclampsia, might demand the application of the forceps before full dilatation of the cervix, though this exception was likely to disappear with the introduction of cervical dilators after the pattern of Bozzi. That the application of the forceps with an undilated cervix might be followed by disastrous results, was proved by the not infrequent occurrence of vesico-cervico-vaginal fistulæ the result of direct laceration, as distinguished from fistulæ the result of sloughing from delayed application of the forceps.

Statistics from the Rotunda Hospital showed that during Dr Johnstone's mastership, when forceps were applied in about 75 per cent. of the cases, in many of which the cervix was undilated, the result was a doubling of the maternal mortality as compared with the more favourable results obtained by his more conservative predecessors and immediate followers. His rate of infantile mortality was only 9 per cent. as contrasted with 53 per cent. under the mastership of Dr Clark. This result was probably accounted for by the substitution of the forceps for craniotomy. By far the most frequent reason for the application of the forceps was the unsatisfactory advance of the head during the second stage of labour as the result of feebleness of the pains or rigidity of the soft parts, especially in primiparæ.

This was doubtless the class of case where the element of abuse was most likely to come in. Although it was perhaps undesirable that any time limit should be taken as the basis for operative interference in this type of case, yet it seemed to the author that it was a tolerably reliable guide. If we took the average second stage in a multiparous patient as being one and a half hours, and in primiparous patients as two hours and a half, then he thought it was desirable (though perhaps not absolutely necessary) to apply the forceps if the second stage lasted over two hours in a multiparous patient and four hours in a primiparous patient. By following this rule we obeyed the mandate of Sir James Simpson: "You should only wait till you see what Nature can do, not what she can endure."

This time limit was not accepted as a guide by some authorities. Winckel taught that weak pains never indicated the forceps, and that they should only be applied when distinct signs of danger to mother and child arose. Galabin, on the other hand, did not delay applying forceps until the graver symptoms of delayed labour appeared. Young practitioners were apt to yield to the entreaty of the patient's friends and to apply forceps, whereas Pajot's principle should dominate all midwifery—"the duty of the accoucheur is patience." One should not interfere without a decided indication; but as soon as ever that occasion is presented, it must be attended to without delay; and it must never be forgotten that in midwifery, methods of interference which will save two beings are at the right time easy, but become in a few hours dangerous, futile and impossible.

In minor degrees of contracted pelvis of the justo-minor type, the advantages of the forceps were generally recognised. In primiparous cases, Professor Kynoch was convinced that such delivery was safest in the interests of the child, and in no way increased the danger to the mother. In multiparous patients he believed that version had yet a field of usefulness. Many still-born children and many maternal lacerations were due to the too easy application of the forceps before the head had time to mould into the most favourable position. Statistics clearly showed that with a timely and skilful application of the forceps the infantile mortality was distinctly less than in version cases, and was not accompanied by greater risks to the mother.

In malpositions of the head, as in occiput-posterior cases, in the majority of cases with the aid of time the occiput rotated to the front without assistance. If this did not take place within a reasonable time, the application of the axis-traction

forceps, provided the passages were in a fit state, by favouring descent and flexion, promoted anterior rotation more surely than manual attempts. The late Dr Milne Murray perfected the instrument for such cases by flattening the pelvic curve. Although in persistent occipito-posterior cases labour was prolonged, and there was great risk of perineal rupture, yet the author believed that such cases terminated spontaneously more frequently than was generally anticipated. In malpresentations of the head, as in face cases, expectancy was generally the best treatment. Should anterior rotation of the chin be unduly delayed, the forceps were quite legitimate. In cases of persistent mento-posterior, where immediate extraction was indicated, the forceps had in the majority of cases to give place to some other means of extraction. With brow presentations the forceps were only of use when the head is impacted in the pelvis, or when it was too late to convert it into a more favourable position. The application of the forceps to the after-coming head should, Professor Kynoch thought, be reserved for cases where jaw traction was impossible from the mouth being inaccessible, or where the occiput was behind, and the chin directed to the pubis. In cases of prolapse of the cord, ordinary methods of reposition having failed, the best chances for the child in multiparous patients lay in rapid delivery with the forceps. In primiparous patients, on the other hand, version was preferable. In cases of marginal placenta prævia, the os being fairly dilated, but the pains not strong enough to deliver the child quickly, the forceps should be applied chiefly in the interests of the child.

In speaking of the application of the forceps, Professor Kynoch said that previous to rotation of the occiput, the blades should be applied over the biparietal diameter of the child's head, although more difficult to do than merely introducing them in the transverse diameter of the pelvis without reference to the child's head.

As regards the statistics of forceps operations, it was pointed out that the percentage of cases was much smaller in hospitals than in general practice. The average of Continental maternity hospitals was 3.6 per cent., whereas it was higher in these institutions in our own country. This probably arose from the fact that we made use of the forceps in cases of the high operation, while version was preferred on the Continent. In the Edinburgh Maternity Hospital, 10 per cent of the indoor cases were instrumental, while in the outdoor department only 4·3 per cent. were instrumental. In Glasgow, the figures were respectively 18 and 6 per cent.; in Dundee, 7 and 5 per cent.; in Manchester, 9 and 1 per cent.; and in the Rotunda Report

for last year the figures were 3.5 per cent. and 1.5 per cent. respectively.

The maternal mortality in these reports were *nil*, while the average infantile death-rate where the forceps *might* be responsible for the child's death was slightly over 6 per cent. The question of morbidity had to be considered, however. In Dresden, 85 per cent. of lacerations Münchmeyer stated to have been due to forceps even scientifically applied. In Germany forceps were much more commonly employed in private practice than they were in maternity hospitals. The figures of Bockelmann and Dewar showed a gain in the infantile results as a consequence of the more frequent application of the forceps as contrasted with the results obtained by their more limited use in hospital practice. With regard to morbidity, their results clearly showed that severe perineal tears were more frequent in unaided cases, and that the convalescence after forceps cases compared favourably with non-instrumental deliveries. It had not been proved that by a frequent application of the forceps a very *large* saving of fœtal life was obtained, but there was at least a slight saving with equally good results for the mother. Professor Kynoch thought that we were justified in holding that in the hands of a skilful operator, and the necessary conditions being satisfactory, a moderately frequent use of the forceps was to be recommended. He thus shortened the patients' suffering without increasing risk to the maternal or fœtal life. It had to be remembered, however, that too little knowledge in the technique of the application of the forceps, and over-confidence in the use of antiseptics, were the cause of many pelvic lesions following instrumental delivery, and Professor Kynoch concluded by advocating a more systematic training of medical students in clinical midwifery, alluding to the advances which had been made in Edinburgh through the efforts of the late Dr Milne Murray, who, in the short years allotted to him, did so much not only to maintain but to enhance the reputation of the Edinburgh School of Obstetrics.

Dr Michael Dewar said that all must agree that there were great differences of opinion as to what was a necessary and what an unnecessary use of the forceps. He confessed that sometimes he employed them when his own better judgment rather advised him against this. He thought that the greater number of cases of abuse of the forceps took place in the low form of operation. If such cases were left to themselves a great number would terminate favourably, but one had very often to deal with (1) neurotic patients who demanded chloroform and assistance; (2) cases of inertia uteri, where the pains faded away; (3) the fixing of a normal head in a normal pelvis, so causing a lingering

labour; (4) cases of occipito-posterior presentations, not amenable to reposition—all such cases often demanded the employment of forceps. Dr Dewar's conclusion was that the judicious use of the forceps need not complicate matters more than happened in ordinary cases, and that when the head was impacted at the brim their use was absolute.

Dr James Ritchie thought that forceps should not be employed unless necessity arose. Thus he would not apply them merely because a patient called for chloroform, nor if it were merely to spare the time of the practitioner. If steady though slow progress were being made, then forceps ought not to be employed, and this was specially true in the case of primiparæ. He did not hold to any time limit as had been proposed; as, for example, in the case of a primipara, if no progress were being made within two hours, he would then apply forceps. One ought never to allow a patient to become exhausted. He was sure that the morbidity was markedly diminished by the timeous use of the forceps. In cases of slightly contracted brim where the os uteri was not fully dilated but yet dilatable, then he would not wait but would apply forceps in such a case. Dr Ritchie did not agree with Professor Kynoch as regards safety to both mother and child while the membranes remained unruptured. He thought that there might be great danger to the mother in such cases though there might be none to the child. He thought that one reason why there was a lower forceps rate in maternity hospitals was that the pelvis amongst the labouring classes was larger than it was amongst the better classes, and so the private practitioner had a larger percentage of instrumental deliveries.

Dr S. Macvie of Chirnside said that he did not like the term "abuse of the forceps." This implied moral delinquency. Personally he used the forceps whenever he could get the chance. He was not tied down by any rules, as time or face case not rectifying itself, etc. He held to no slavish following of rules. It was not routine but skill which was necessary, and one ought never to wait until danger threatened, but one should avoid it by the use of the forceps. He thought that there was a more rapid convalescence after short forceps cases than when such were left to terminate themselves slowly. He would never employ forceps under compulsion of the patient unless there was a clear indication for their use.

Professor Sir Murdoch Cameron, amongst other remarks, said that the proper way to treat an occipito-posterior case was to convert it to a cranial one by means of the forceps, and then having readjusted the instruments, to keep them on and leave the case to nature. Another indication for the use of

forceps was in cases where the child's head lay on the perineun and would not advance. In cases of lateral placenta prævia he would not apply forceps but would turn. In all cases where there was obstruction to delivery and where we were certain that the child was dead, then perforation was demanded, and so delivery was accomplished without injury to the materna structures.

Dr Hamilton of Hawick said that he had attended some 5000 confinements, and had never employed the axis-traction forceps, but had found the old-fashioned Simpson's forceps perfectly satisfactory. The greatest danger in midwifery practice lay in the neglect of antiseptics.

Professor Kelly of Glasgow thought that one great indication for the use of forceps had been omitted. In cases where the head was on the perineum, then the employment of chloroform and delivery by the forceps resulted in the greatest saving of the perineum from laceration.

Dr Somerville of Galashiels agreed with Dr Hamilton in thinking that Simpson's forceps performed all that one could wish.

Dr Reid, Glasgow, said that as the years passed he employed forceps less and less frequently, and in proportion he employed chloroform more and more frequently. He had no doubt as to the dangers of forceps. One saw only too often in hospitals the bad results of their employment. Forceps were often applied long before they were necessary, so giving rise to cervical tears and inflammatory mischief. He thought one should be very careful of converting a physiological into a pathological condition.

Dr Spence, Burntisland, said that he had attended more than 3000 confinements. It was his practice to use forceps very frequently, and as yet he had never had to regret using them. He thought, however, that Dr Milne Murray's forceps were much better than Simpson's.

Dr Russell, Glasgow, spoke of the great need for very careful aseptics in midwifery practice, and thought that as great care should be taken in this direction as in any surgical operation. He advocated very careful measurement of the pelvis before undertaking any operative measures.

Dr Elsie Inglis advocated the employment of chloroform in midwifery practice, and stated that its use frequently did away with the necessity for forceps.

Professor Kynoch replied, and the members to the number of nearly sixty then partook of dinner, and a very enjoyable evening was spent.

Forfarshire Medical Association

THE forty-sixth annual meeting of the Association was held in the Glenesk Hotel, Edzell, on Thursday, June 30th, 1904—Dr John Anderson, Brechin, President, in the chair.

The Treasurer submitted his annual statement (*vide* later) of the income and expenditure of the Association.

Dr Graham Campbell, Dundee, moved the election of the following gentlemen as office-bearers for the ensuing year:—President, Dr Key, Montrose; Vice-Presidents, Dr W. Kinnear, Dundee, Dr Barron, Letham. Council—Drs Guild, M'Vicar, Stalker, Rogers, Halley; Dr Charles Kerr, Reporting Secretary; Dr G. W. Miller, General Secretary; Dr Foggie, Treasurer; and the local Secretaries as before.

Dr Mackie Whyte seconded, and in doing so referred to the work which the retiring Secretary had done for the Association.

Dr Key, Montrose, also spoke as a county member of the work which had been done for the Association by the retiring Secretary.

Dr Urquhart, Perth, hoped that what had been said would be recorded in the minutes. He also asked if the Council had considered the advisability of giving a donation to the British Medical Benevolent Fund, and mentioned a case in the Perth district where benefit was being derived from the fund.

Dr Halley thanked the gentlemen who had spoken for their kind expressions regarding the work which had been done during the past seven years. He said he had resolved to retire, as he considered it would be for the best interests of the Association that the work be now placed in new hands.

The President then delivered his address on "Brechin as he has known it." In it he compared Brechin as it was thirty years ago with what it is now, discussing the changes that had taken place in the methods of treating diseases, the changes in Brechin buildings and in its industries. The address was much appreciated. At the close a hearty vote of thanks was awarded to the President, and it was unanimously agreed to have the address printed at the Association's expense and distributed amongst the members.

The members thereafter sat down to dinner, under the presidency of Dr Anderson, supported on his right by Provost Melvin, Dr Key (Montrose), and Dr Havelock (Sunnyside). On the Chairman's left were Mr Stiles, Edinburgh; Dr Adam, Brechin; James Duncan, Esq. of Balfour. Dr Graham Campbell, Dundee, one of the Vice-Presidents, acted as croupier; and was supported on his left by Dr Urquhart, Perth; and Dr Mackie Whyte, Dundee; by Dr Templeman, Dundee, on his

right. There were also present, Drs Jamieson, Brechin; Aymer, Bervie; Gilruth, Arbroath; Peterkin, Forfar; Lumsden, Edzell; Guild, Don, Halley, Foggie, Kynoch, M'Vicar, G. Miller, Dundee.

The toast of "The King" was suitably proposed by the President, and responded to by the company.

The Secretary then intimated letters of apology from Dr Norman Walker, Edinburgh; Drs Rorie, Dundee; Douglas, Cupar; Constable, Leuchars; T. F. and W. J. Dewar, Arbroath; Robertson, Errol; Leishman, Brechin; C. Moon, Dundee; Coleman, Wemyss, Mackness, Broughty Ferry; R. Cochrane Buist, Dundee; M'Alister, Forfar. Telegrams were intimated from Professor Musgrove, St Andrews; Drs M'Donald, Cupar; Hunter, Dundee; Laing, Arbroath; and Sinclair, Brechin.

"The Imperial Forces" was next proposed by the Chairman; and replied to by Captain Campbell, of the 1st Forfar R. G. Artillery Volunteers, who credited the Government with any faults the Volunteers had.

Dr Adam proposed "The Guests," to which Mr James Duncan replied, thanking the Association for having honoured his father's name by inviting him to a medical gathering.

Provost Melvin next proposed the toast of "The Forfarshire Medical Association," and referred to the age of the Association, and the fact that one of his own townsmen was its only remaining original member.

Dr Key replied. In his reply he gave interesting memories of his own teachers, especially referring to Professors Simpson, Syme and Goodsir. He passed round a letter written by Professor Syme in 1862 to him about a patient of his on whom Mr Syme had operated for stone.

Mr Stiles proposed the health of the President.

Monthly Return of the Births and Deaths registered in Eight of the Principal Towns of Scotland during June 1904

DURING the month of June 1904, there were registered in the towns of Glasgow, Edinburgh, Dundee, Aberdeen, Paisley, Leith, Greenock, and Perth, the births of 4452 living children, of whom 2276 were males and 2176 females. These births are equivalent to an annual birth-rate of 31.4 per thousand of the estimated population of these towns. The birth-rate during the month was highest in Paisley, 34.2; and lowest in Perth, 23.0. In Glasgow, it was 33.9; in Leith, 33.4; in Aberdeen, 30.8; in Greenock, 29.8; in Dundee, 29.3; and in Edinburgh, 26.8.

Of the 4452 children born during the month, 4148, or 93.2 per cent., were legitimate, and 304, or 6.8 per cent., were illegitimate. This illegitimate rate was highest in Dundee, 8.1, and in Aberdeen, 8.0; and lowest in Greenock, 4.7, and Perth, 4.7. In Edinburgh it was 7.8; in Glasgow, 6.5; in Paisley, 6.4; and in Leith, 5.0.

Deaths registered during the month numbered 2359, of which 1205 were males, and 1154 females. The equivalent annual death-rate is 16.6 per thousand of the combined population. This rate is 1.6 less than that for May, and 2.0 less than that for June 1903. The actual number of deaths is 302 fewer than in May, and 242 fewer than in June 1903.

The highest death-rate for the month is recorded in Dundee, 18.8; and the lowest in Leith, 11.6. In Perth it was 18.3; in Aberdeen, 17.8; in Paisley, 17.2; in Greenock, 16.8; in Glasgow, 16.7; and in Edinburgh, 15.7. These rates for Aberdeen, Paisley, and Perth are higher than the rates for May, while in the remaining five towns these rates are lower than those for May.

Of the 2359 deaths, 797, or 33.8 per cent., were of children of under five years old, and 526, or 22.3 per cent., of persons of over 60. Compared to the figures for May, the deaths of these children are 123 fewer, and the deaths of old people 131 fewer.

The deaths are recorded of 456 children of under one year old. This is equivalent to an infantile mortality of 110 per thousand births. This infantile mortality rate was during the month highest in Dundee, where it was 136; and lowest in Leith, where it was 67. In Aberdeen it was 127; in Paisley, 118; in Edinburgh, 114; in Glasgow, 105; in Greenock, 95; and in Perth, 75.

The seven principal epidemic diseases accounted for 256 deaths during the month; this is 3 more than during May. The equivalent death-rate is 1.8 per thousand. This rate was highest in Greenock, 3.1; and lowest in Perth, 0.7. In Dundee it was 3.0; in Paisley, 2.5; in Edinburgh, 1.8; in Glasgow, 1.7; in Aberdeen, 1.1; and in Leith, 0.8.

Deaths from small-pox numbered 9. This is 1 fewer than in May, and 9 fewer than in April. These 9 deaths were all in Glasgow; of them 6 were of persons who had been vaccinated, 1 of a person who had not been vaccinated, and 2 of persons whose vaccination was doubtful.

Deaths from whooping-cough numbered 105, from measles 63, from scarlet fever 9, from diphtheria 19, from enteric fever 12, and from diarrhœas 39. Compared with the returns for May, deaths from whooping-cough are 9 fewer, from measles 6 fewer, from scarlet fever 8 fewer, from diphtheria 7 more, from enteric fever 4 more, and from diarrhœas 16 more.

Deaths from influenza numbered 7. This is 8 fewer than in May, and is the same number as in June 1903.

Deaths from puerperal septic conditions numbered 5; from malignant tumours 127; from apoplexy 109; from heart disease 219; and from premature birth debility 65.

Deaths from pneumonia numbered 209, and constituted 9.5 per cent. of the total deaths; from bronchitis 147, or 5.3 per cent. of the total deaths; and from phthisis 224, or 9.5 per cent. of the total deaths. Deaths from phthisis were 63 fewer than in May, from pneumonia 19 fewer, and from bronchitis 37 fewer.

There were 108 deaths registered as due to violent causes; of them 7 were suicidal, these being all by hanging.

The deaths of nine persons of over 90 years of age are recorded; among them were two widows of 95.

The Meteorological Returns for June 1904

THE meteorological returns for eight of the principal towns in Scotland, reduced and corrected as heretofore for instrumental errors, give for their mean position, *i.e.* Lat. 56°.12′ N., and Long. 3°.30′ W., and height 160 feet above the sea-level. For the month of June 1904

Mean barometric pressure, 30.002 inches; greater than the average for the same month of 1856-1900 by 0.058 inch.

Mean temperature, 55°.0; less by 0°.5.

Mean daily range of temperature, 15°.4; being the average.

Mean humidity, 77 per cent.; less by 1 per cent.

Rain, number of days, 12; less by 1 day.

Rain, depth in inches, 1.62; less by 0.70 inch.

Wind, mean force (on scale of 0-12), 2.3; being the average.

Wind, direction of: a 4 days' excess of winds from N.E. and E.

Hence the month of June 1904 was characterised by a high mean barometric pressure; a slightly low mean temperature, with an average mean daily range; a low mean rainfall, with one less than the mean number of rainy days; a large excess of winds of average force from N.E. and E.

The mean temperature was 55°.0, or 0°.5 below the normal, the days and nights being both below their averages by that amount.

The mean rainfall was 1.62 inch, or 30 per cent. below the normal, the month being on the whole the driest June since 1891. Heavy falls in the Edinburgh district on 1st were followed by a rainless spell at all the towns until the 13th, when

unsettled and rainy weather prevailed for a few days. At Edinburgh, Leith and Greenock, heavy falls were noted on 24th. The heaviest daily amounts were 0.87 inch at Greenock on 14th, and 0.73 inch at Edinburgh on 1st. At Dundee the heaviest daily fall, on the 14th, was as small as 0.14 inch.

Early in the month N.E. winds prevailed with somewhat cloudy skies on the East Coast and much sunshine on the West, Fort-William recording 97 hours for the week ending 11th.

From 15th to 17th the weather was very stormy.

Thunder was reported from Marchmont and Drumlanrig on 24th, 25th, and 26th.

Recent Literature

CRITICAL SUMMARIES AND ABSTRACTS

MEDICINE

By EDWIN BRAMWELL, M.B., F.R.C.P.Ed., M.R.C.P.Lond.,
Assistant Physician to Leith Hospital

THE PLANTAR REFLEX, WITH SPECIAL REFERENCE TO THE BABINSKI SIGN AND ITS DIAGNOSTIC SIGNIFICANCE

Introduction.—For many years physicians have been in the habit of examining the plantar reflex in cases of nervous disease. It was only, however, after Babinski had described the special modification of the reflex which is now known by his name, at the same time pointing out its significance, that this examination came to be of primary importance. Several papers have been written on the Babinski sign confirming the observations of the Parisian neurologist as to its practical value. Since these publications have almost all appeared in special neurological journals, a summary of the present state of our knowledge as to the exact significance of this most valuable sign may not only prove of interest but of practical value to those who have not access to these journals.

The writer's personal observations on the plantar reflex are based upon an examination of more than 2000 cases of nervous disease, as well as a large number of individuals suffering from non-nervous affections; his interest in the sign dates from 1898, when he had the good fortune to be associated as co-house-physician, at the National Hospital, Queen Square, with James Collier, whose classical monograph

was the means of introducing the subject to the profession in this country.

Variations in Activity of the Plantar Reflex.—It has long been known that stimulation of the sole of the foot produces a reflex contraction in certain muscles of the lower extremity, and for many years the presence or absence of this reflex has been recorded as a matter of routine in the examination of cases of nervous disease. Alterations in the activity of the reflex are of comparatively little diagnostic importance, since considerable variations are met with in health, both in different individuals and in the same individual under different conditions; absence of the reflex is sometimes, however, of use in diagnosis.

The reflex is abolished in lesions which directly implicate those nerves (sciatic and internal popliteal) and that part of the spinal cord [segments L.5, S.1, and S.2 (?)] which constitute its reflex arc. In a case of local spinal lesion, absence of the reflex may therefore afford evidence as to the involvement of those segments of the cord through which the reflex passes. Again, as Dr Buzzard has pointed out, the plantar reflex is often absent in severe cases of hysteria. Further, in some cases of transverse lesion of the spinal cord in which conduction through the cord is completely interrupted, and in which the tendon jerks below the level of the lesion are abolished, the plantar reflex is also absent. Dr Spiller has suggested that in those cases of complete transverse lesion above the lumbar enlargement in which the plantar reflex is lost, there has probably been a secondary softening of the spinal cord below the level of the lesion involving the centre for the plantar reflex. If this suggestion is confirmed, the presence or absence of the plantar reflex may, as Spiller suggests, be of great value in cases of transverse lesion in which the question of operation for the removal of a tumour is under consideration; for it is obvious that, if there is a softening of the spinal cord below the level of the lesion, removal of the tumour will be useless.

It is to be remembered that even in healthy individuals, when the feet are cold or damp, the plantar reflex may be absent. This is a point which it is well to keep in mind, especially in relation to certain qualitative changes in the character of the plantar reflex about to be described. These qualitative changes are of much greater diagnostic importance than the alterations in activity of the reflex above referred to.

Plantar Reflex in Health.—Slight stimulation of the sole of the foot in a healthy person is commonly followed, as Brissaud has shown, by a contraction in the tensor fasciæ femoris muscle.

If the strength of the stimulus is increased other muscles contract, but, so far as is at present known, the contraction of the muscles of the toes, and more especially of the great toe, is, from a diagnostic point of view, by far the most important. The reflex movement of the toes which occurs in health in response to plantar stimulation is always in the direction of flexion—in other words, to use an expression introduced by Collier, the response is always of the flexor type.

There is one exception to the rule laid down in the last paragraph. Stimulation of the sole of the foot in infants is followed by a movement of dorsiflexion, or, as it is more often called, extension of the toes. The "infantile response," as Collier terms it, differs from that of the adult in certain other particulars, but since these differences are, so far as is at present known, of comparatively little practical significance, we shall not describe them. This extensor response is met with in the great majority of young children, some say in all, up to the time when they begin to walk, at which time the character of the response changes from the extensor to the flexor type. It may be that the qualitative change in the response is associated with the completion of myelination in the pyramidal tracts which occurs about the end of the first year, or it may be that it is the direct result of the altered mode of progression.

Babinski Sign or Extensor Response (*Collier*).—In certain cases of nervous disease an extensor response is met with in place of the flexor response, which, as we have seen, is characteristic of health. This is the so-called Babinski sign.

In considering the significance of the Babinski sign, it must be remembered that the motor path is composed of at least two distinct sets of neurons: the upper motor neurons, consisting of the motor cells of the cerebral cortex and their axis cylinders, which pass downwards through the centrum-ovale, internal capsule, crus, pons varolii and medulla oblongata into the spinal cord, where they terminate at different levels according to the special muscles which they are going to supply; the lower motor neurons, consisting of the large multipolar nerve cells in the anterior horn of the spinal cord and their axis cylinders, which pass outwards through the peripheral nerves to the muscles. Whether an intermediary neuron is interposed between the upper and lower neurons in the grey matter of the spinal cord is a point which need not concern us here.

Now, the Babinski sign is of importance in diagnosis, since it is, with the exceptions to be presently mentioned an indication of a structural lesion of or involving the upper motor neuron. Thus, where a hæmorrhage, softening, inflammation or new growth implicates the upper motor neuron at any

level from the leg centre in the cerebral cortex above to the fifth lumbar segment below, *i.e.* above the level of the spinal centre for the plantar reflex, the rule is to find an extensor response, bilateral or unilateral, according as the motor tract on one or both sides is interfered with. In like manner, when the upper neuron is the seat of a primary degeneration, or when the spinal cord or cortical motor centres for the leg are pressed upon, the rule is to find a plantar reflex of the extensor type.

In cases of disease of the lower motor neuron, on the other hand, such as peripheral neuritis, poliomyelitis, etc., the flexor type of reflex remains unchanged.

In morbid conditions, such as amyotrophic lateral sclerosis, where both the upper and lower neurons are diseased, the extensor reflex is met with, provided that the lower neuron lesion does not implicate those segments of the spinal cord through which the plantar reflex arc passes.

Further, the Babinski sign is an extremely delicate indication of implication of the upper motor neurons. For instance, in the early stages of a case of pressure paraplegia, before there is marked weakness or rigidity in the lower limbs and before ankle-clonus appears, an extensor response is often present. The writer has seen a case where complete recovery followed the removal of a tumour pressing on the spinal cord in which the Babinski sign was still present some time after ankle-clonus had disappeared. Another instance of the delicacy of the sign was afforded by the case of a man suffering from symptoms of combined tabes and general paralysis. In this case both the knee- and ankle-jerks were absent, and yet there was a bilateral Babinski sign. On microscopical examination a very extensive tabetic degeneration of the posterior columns was found, while scattered through the pyramidal tracts there were also a few degenerated fibres. It is well known that the knee-jerks may return in a case of tabes in consequence of a superadded upper neuron lesion. In this case there was a lesion of the upper motor neurons as shown by the degeneration in the pyramidal tracts, accounting for the alteration in the type of reflex, but the pyramidal affection had been insufficient to reinstate the knee- and Achillis-jerks.

It is interesting to note that in cases of hemiplegia the type of the plantar reflex on the affected side changes from flexion to extension almost immediately after the occurrence of the lesion. The writer has detected an extensor response on the paralysed side in a case examined two hours after the "shock," and Barnes mentions a case in which it was present within half an hour. The presence of the Babinski sign may thus prove of value in cases of coma where a cerebral lesion is suspected,

although it must be remembered that during profound coma all the reflexes, both superficial and deep, are abolished. It may be mentioned here that in some cases of hemiplegia a Babinski sign is obtained on the non-paralysed side. Exaggeration of the knee-jerk and occasional slight ankle-clonus are also present on the sound side in some hemiplegics. The inconstancy of these symptoms is no doubt to be accounted for by variations in the bulk of the homolateral or uncrossed fibres which descend in the crossed pyramidal tract.

It has been stated above that the Babinski sign is an indication of organic disease implicating the upper motor neuron. This statement requires slight modification.

For a short time after an epileptic convulsion not uncommonly an extensor response may be obtained. The extensor response sometimes persists for two or three hours after the attack. This fact is in accordance with Dr Beevor's observation that ankle-clonus is in some cases present for a short period after a convulsive attack. Temporary exhaustion of the upper neurons as a consequence of the series of discharges which have occurred in them affords a reasonable explanation of these phenomena.

An extensor response is said to occur in cases of strychnine poisoning and in tetanus.

It may be stated, then, that, apart from the infantile response and the temporary extensor response which occurs after a convulsive fit, the Babinski sign indicates an organic affection of the upper motor neurons, either a primary degenerative process or a lesion which, occurring in the neighbourhood of the tract, has involved it.

The converse of this statement does not hold good; in other words, cases are sometimes met with, *e.g.* some cases of old-standing hemiplegia, birth palsies, etc., in which, although there is an organic lesion of the cortico-spinal tract, the plantar reflex is of the flexor type. Hence the presence of a flexor response does not necessarily justify the positive assertion that there is not organic disease of the upper motor neuron. The want of recognition of this fact is, in the writer's opinion, one of the chief reasons why so much dubiety still exists in the minds of many physicians as to the value of the sign in diagnosis.

The Babinski Sign in the Differential Diagnosis of Organic Disease and Hysteria.—Without doubt, the chief value of the Babinski sign is in relation to the differential diagnosis between certain organic affections and hysteria. The writer has never seen an extensor response in a case of hysteria in which there were not other signs pointing to organic upper neuron disease, either present at the time of examination or subsequently

developed. The opinion of most observers is in accordance with this statement.

From time to time, cases of supposed hysteria have been described in which an extensor response is said to have been present. It is well to remember in this connection, firstly, that a rapid dorsiflexion of the toe, which is really a voluntary movement, may closely resemble the true reflex; secondly, that because a patient who has an extensor response recovers, the reflex assuming the flexor type, it does not follow that the case was one of hysteria; and, thirdly, that hysteria is very often associated with organic disease, and the symptoms of the latter may be completely overshadowed by those of the former affection. An interesting case in point was that of a young girl who presented very definite symptoms of hysteria, viz., aphonia, a hemianæsthesia of the hysterical type, and a characteristic hysterical gait. Upon examination, however, it was found that, in addition to a well-marked Babinski sign in each foot, she had double ankle-clonus, precipitate micturition, a girdle sensation, slight nystagmus on lateral deviation of the eyes, and pallor of one optic disc. The case was a typical example of hysteria, and yet the patient had definite physical signs of organic disease. The hysterical symptoms were recovered from and she was apparently almost well, but when seen a year later she presented the classical features of disseminated sclerosis.

The presence of the Babinski sign is of the greatest value in distinguishing disseminated sclerosis from those cases of hysteria which so closely simulate this disease. It is also of use in differentiating cases of organic from hysterical hemiplegia.

The writer has on several occasions examined the plantar reflexes after an hysterical fit, but he has never found an extensor response. In this respect his experience coincides with that of Stanley Barnes. The presence of a definite Babinski sign immediately after a fit would point to the fit being epileptic, using the word in its widest sense, as opposed to hysterical.

Method of Examination.—It is necessary to say something regarding the method of examining the plantar reflex. In cases presenting a typical Babinski sign there is nothing easier: the limb may be placed in any position and stimulation of any part of the plantar surface will elicit the deliberate dorsiflexion of the great toe and the slow return to the normal which is characteristic. Where the sign is not so well marked, the examination must be carried out with the greatest care. For it, the patient should be in the dorsal position, but lying rather on the side of the leg to be tested. The thigh is flexed on the abdomen to about a right angle, the leg on the thigh to about the same degree, and the limb allowed to rest on its outer surface on the bed. In this

position the muscles are relaxed. The observer grasps the dorsum of the foot to be examined with one hand, and with the other, in which he holds a quill, a key, a pin, or some such object, he stimulates the plantar surface. It must not be supposed that in all cases the characteristic deliberate extension of the great toe is obtained. All variations of response between typical extension and flexion are met with. Barnes refers to these as transition forms, and, as he points out, the different phases through which the reflex passes as it changes from the extensor to the flexor type may be well seen in a patient who is just recovering from an epileptic fit. Finally, a stage is reached to which this author applies the term "pyramidal equilibrium," in which it is impossible to say whether the response is flexor or extensor. As Harris justly remarks, "the proper appreciation of the plantar reflex in a doubtful case is often very difficult." It is very important to avoid confusing a rapid voluntary movement of dorsiflexion of the great toe, which sometimes follows the application of the stimulus with the true reflex. A very light stimulus should first be tried, for where the reflex is not well marked the extensor response may become exhausted after the application of one or two stimuli and change to the flexor type. The extensor response is occasionally elicited only on powerful stimulation. Where the reflex is well marked it can usually be obtained from the whole plantar surface and sometimes from the dorsum of the foot and front of the leg. In some cases it is only to be elicited by stimulation of the outer part of the plantar surface, stimulation of the inner part producing a movement of flexion. Again, the writer has met with a few cases in which an extensor movement has only been obtained from the ball of the great toe. Whenever an extensor reflex is obtained, even though it was only on the first application of the stimulus and only from a very limited area of the sole of the foot, it points to implication of the pyramidal tract. A single undoubted reflex movement of extension justifies this statement, even if every succeeding stimulus is followed by a flexor response. Another point to be remembered is, that the plantar reflex is often absent, as already mentioned, when the feet are damp or cold, or after the patient has been standing for any length of time.

Summary of some of the More Important Points regarding the Babinski Sign.

Examination.—Place the patient in the position above described. Use at first light stimulation. Examine especially the outer part of the plantar surface and the ball of the great

toe. Remember that when the feet are cold and damp, and after the patient has been standing for any time, the plantar reflex is often absent; and therefore it is advisable, if no response is obtained, to examine the patient in bed. A single movement of extension, provided that it is undoubtedly reflex, is of the greatest significance, even if on further stimulation movements of flexion are alone obtained.

Clinical Significance.—An extensor response is present in the great majority of infants, perhaps all.

In "healthy" persons after the first year of life, the plantar reflex is always flexion, *i.e.* a Babinski sign is never met with.

The Babinski sign means implication of the upper motor neurons by organic disease. Exceptions to this statement are: (*a*) the infantile response; (*b*) the extensor response, which occurs after an epileptic convulsion; (*c*) the extensor response, which has been described in strychnine poisoning and in tetanus.

The Babinski sign is an extremely delicate indicator of an organic affection of the upper motor neurons.

Absence of the Babinski sign does not necessarily exclude organic disease of the upper motor neurons, for in some cases of old-standing hemiplegia, etc., the response is of the flexor type.

The Babinski sign probably never occurs in a case of hysteria uncomplicated by organic disease.

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GENITO-URINARY SURGERY

BY DAVID WALLACE, C.M.G., F.R.C.S.

COMPARATIVELY little attention has been directed to one portion of the genito-urinary tract—the vesiculæ seminales—and yet diseases of varying character in them are not uncommon. They are apt, however, to be overlooked, as the symptoms they produce are obscure, and liable to be mistaken for those of the bladder or prostate. The vesiculæ seminales may be the seat of inflammation, which may go on to abscess formation, but more commonly it is chronic and gives rise to a sclerotic condition. Tumour or tubercle are rarely primary in them, but instances of both have been recorded. When healthy, the vesiculæ semi-

nales are not readily felt on rectal examination, and, indeed, frequently no effort is made to palpate them, but they should be examined in all cases where the symptoms leading to rectal examination are at all obscure. If diseased, they are readily palpated, and in the diseased state, *e.g.* sclerosis, acute inflammation or over-retention, are apt to reflexly influence the bladder or prostate, causing perineal pain and frequency of micturition. Eugene Fuller (*New York Medical Record*, May 1904), in an article entitled, "Operative Surgery applied to the Seminal Vesicles," relates 21 cases in which he performed an operation. He emphasises the value of the method he adopts to reach them, which he believes, with reason, to be preferable to the older plans of incision through the rectum or by perineal section (trigone or prostate). The patient is placed on a flat table, kneeling with the knees flexed sharply under him, and with the shoulders so depressed that the side of the face lies on the table. A full description of the operation is given in the *Journal of the American Medical Association*, May 1901, but the above position is, in the author's opinion, an improvement upon that previously adopted. The surgical method consists of the exposure of the cavity of the seminal vesicle through a free, longitudinal incision, and then drainage, curettage, or the removal of intra-seminal vesicle neoplasms. It can also be used for peri-seminal vesicle abscess drainage.

Dr Fuller groups the 21 cases into five classes:—

1. Six chronic cases of seminal vesiculitis, in which the lesions consisted chiefly of sclerous tissue.

2. Eight cases of less chronic vesiculitis, in which intra-vesicle catarrh was a prominent feature.

3. Five cases of acute diffused peri-seminal vesicle abscess. In each of these gonorrhœal infection had been the causal condition.

4. One case of adenoma; and

5. One case of tuberculous involvement.

All of these are described in some detail and well repay perusal. The author deprecates attempts to remove by operation tuberculous vesicles.

The Surgery of Nephritis.—In a previous summary (January 1904) the writer discussed the subject of the surgical treatment of nephritis, but as it is one of much interest, and as the reported cases are not very numerous, further evidence regarding it may be of value. Edebohls in the *New York Medical Journal* (May 21 and 28, 1904) critically discusses the various papers and reports of cases up to date. It is unnecessary to refer to the historical portion of his papers, but his views, in the light of his

greater experience, upon the rationale of the treatment are instructive. He believes the immediate good effect of decapsulation depends upon the massage of the kidney incident to the operation; while the remoter and continuous benefit is due to the vascular changes which follow the decapsulation. He does not believe that contraction of the new capsule occurs, and refers to two autopsies upon patients who had died, the one four and the other fifteen months after operation. Dr Larkin made careful sections in these cases, and found in the former that there were numerous new vessels penetrating along connective tissue paths into the kidney. Experimental work by Anzilotti corroborates this. It is only natural that the author should also emphasise the fact that patients upon whom he has operated two or three years since have remained well, and from urine-analysis are known to be free from chronic nephritis. As a result of his extended experience Dr Edebohls now considers that he is "derelict to duty imposed by knowledge gained by experience if at the present stage of the question and with three conditions fulfilled, I fail to advise renal decapsulation for every sufferer from chronic Bright's disease who consults me and who has a reasonable expectation of not less than a month of life without operation. These three conditions are—1st, the clear and unequivocal establishment of the diagnosis of chronic Bright's disease; 2nd, the absence of absolute contra-indications to *any* operation; 3rd, the possibility of securing the services of a surgeon reasonably familiar, from practical experience, with the surgery of the kidney." This position in regard to surgical treatment of chronic Bright's disease is much more advanced than that formerly taken by the author, but he believes results have justified his adoption of it. At the end of his paper he gives references to sixty-four papers on the subject—a proof in itself of how the importance of the question has grown within the last year. That this importance is widely recognised may be partly gauged when we note that it is one of the three suggested themes for discussion in Section 10 of the International Medical Congress to be held at Lisbon in April 1905.

Urinary Tuberculosis.—The advance in our means of locating the site of tubercle in the urinary tract has demonstrated the frequency of primary renal tuberculosis, and the rarity of primary bladder affection. It is now well recognised that renal tuberculous disease frequently causes bladder symptoms, more particularly pain and frequency of micturition when the bladder is free from any tuberculous disease. A further important fact has been ascertained, that renal tubercle is often unilateral. The appreciation of these facts has led to much earlier treatment of

the diseased kidney, with the result that much permanent success in treatment has been obtained. Dr Hunner of Baltimore in an article, "Urinary Tuberculosis in Women" (*American Medicine*, April 1904), relates a series of thirty-five cases, and directs attention to the importance of using all the means at the disposal of the surgeon to accurately diagnosticate the site and extent of the disease. The condition of the urine as an aid to location of the disease is shown to be misleading, and the importance of cystoscopic examination is insisted upon. In these cases tubercle of the bladder was the exception, even as a secondary involvement, unless by extension along the ureter directly, *i.e.* not through the medium of the urine. The operation of Nephro-ureterectomy, as performed by Dr Kelly, is described in some detail, two incisions, extraperitoneal, being used in preference to one of great length. This paper is a valuable contribution to the surgery of this important subject.

DISEASES OF CHILDREN

By J. S. FOWLER, M.D., F.R.C.P.,
Extra Physician, Royal Hospital for Sick Children

On German Measles and Double Infections (Pospischill, *Jahrb. für Kinderheilkunde*, June 1st, 1904).—This is a most elaborate paper, and is valuable in being obviously written by an accurate observer with a very large experience of infectious disease; the views, in support of which many illustrative cases are reported, are novel, and seem well worthy of the attention of those in a position to confirm or controvert them. The writer of this abstract believes he has given an accurate *résumé* of the paper, an outstanding feature of which is a most obscure and cumbrous style; if he has failed, it is despite his best efforts to trace the author's thoughts through the sentences in which they are expressed.

German Measles.—In the diagnosis of Rötheln the following points are those on which reliance should be placed:—(1) *The incubation.*—The rash appears from the 13th to the 19th (usually the 14th) day after exposure to infection. An incubation of more than fourteen days is in favour of Rötheln and against measles. When there is difficulty in deciding between the two diseases, especially in schools, etc., it is important to notice whether children unprotected against measles escape. On account of the great susceptibility to measles, this points to the doubtful exanthem being German measles. (2) *Koplik's spots* are never seen in German measles. They have no relation to

the ordinary enanthem of measles, of which disease they are pathognomonic, and can be mistaken for no other lesion of the mouth. (3) *Prodromata* occur in not more than half of the cases of Rötheln; sneezing is the most common. In children known to have been exposed to infection, and therefore carefully watched, Pospischill has only once seen the enanthem precede the exanthem. The prodromal stage is usually afebrile. (4) The *enanthem* appears simultaneously with the outbreak of the exanthem; it is often quite characteristically like the eruption on the skin, but soon loses its spotted appearance, and becomes a diffuse redness, closely resembling the stomatitis of measles and scarlatina. (5) The *rosy, somewhat puffy cheek* of the German measles patient is of differential diagnostic value. It is not due to a confluent rash, and, though suggesting the flush of fever, is present when the skin is quite cool. In the meshes of the rosy area the typical Rötheln spots can be seen. (6) The *rash* consists of small, circular, almost flat, rose-red, closely set spots; more often than the other exanthemata is it limited to a part of the body; its development being favoured by mechanical or thermal irritation, it is especially well marked on the shoulder-blades and buttocks. The comparative freedom of the chin and forehead, and the flushed complexion, resemble scarlet fever, especially when the rash on the body is closely set. In this case it is best distinguished by looking at it from a little distance, which shows up the puffy appearance of the eruption. No difference in the age of different parts of the rash can be made out. Hæmorrhagic eruptions are rare, and occur solely in complicated cases; they should, therefore, suggest this, and especially the co-existence of scarlet fever or whooping-cough. A very early measles rash without fever or Koplik's spots is extremely like Rötheln, but the course is a guide, as the rash of measles spreads much more slowly than that of its congener. (7) The *temperature curve* shows either (*a*) initial fever only, or (*b*) a febrile course throughout. The temperature is highest in the prodromal, not in the eruptive stage, and in uncomplicated cases does not rise above 100 degrees. Too much stress should not, however, be laid on the temperature, on account of the occurrence of afebrile measles. A high temperature in German measles implies a complication, such as scarlet fever or whooping-cough. The association of Rötheln and influenza gives a clinical picture almost indistinguishable from measles. Influenza is usually primary, German measles secondary. The author deprecates sending so mild a disease as this to a fever hospital, on account of the risks of new infection involved. The great stumbling-block in diagnosis is mild, afebrile measles, without prodromal

symptoms. The eruption, however, though slight, asserts the characteristics of measles, and there is also the usual liability to such sequelæ as otitis and bronchitis. [It will be noted that no weight is laid on glandular enlargement as a diagnostic sign of Rötheln.]

Double Infections.—The bulk of the article is devoted to a consideration of scarlet fever occurring as a complication of other infectious diseases. The underlying conception of a double infection with the exanthemata and ordinary infectious diseases (whooping-cough, diphtheria, etc.) is, that when scarlatina forms one of the components, the result differs from what takes place with any other combination of the diseases in this respect —that the scarlet fever is looked on *as a purely secondary infection predisposed to by the already existing one.* This idea seems somewhat novel, but when we remember the short incubation period—only a few hours in some cases, the extreme tenacity of the contagion, as compared with that of measles, for instance, the occurrence of surgical and puerperal scarlet fever where infection takes place through open wounds, and finally, the evidence pointing to scarlatina being a coccal infection, the view has several points in its favour. It is obvious that when measles and scarlet fever rashes develop simultaneously, the patient must have become infected with the latter at the time when the early symptoms of measles were developing, *i.e.* he was already in an abnormal condition; whereas, when two of the other exanthemata, the incubations of which are approximately similar, occur together, the infection of both was received at about the same time by a more or less healthy individual. The bearing of these remarks will be more evident in the sequel.

Measles and Scarlet Fever.—From a large experience of mixed infections with the exanthemata, Pospischill has found that scarlet fever does not complicate all periods of another infection with equal frequency, but has a special predilection for doing so just as the rash is coming out. This is not a mere accident, due to the conditions under which infectious cases are dealt with by the sanitary authorities, because we do not find the same early infection with scarlet fever in whooping-cough and diphtheria. It is rather due to a heightened predisposition to scarlet fever at certain periods. While coincident varicella and scarlatina eruptions do not affect each other, and while in German measles-scarlet fever cases the eruption of the former is modified by that of the latter, *when scarlet fever complicates measles a new type of rash is created which resembles that of neither measles nor scarlet fever.* The great bulk of observations show that at the end of the incubation stage and in the early

days of the invasion of measles, there is increased predisposition to the scarlatinal infection. Measles-scarlet fever is a more frequent combination than diphtheria-scarlet fever or whooping-cough-scarlet fever; in some cases the author has even seen a patient convalescing from German measles-scarlet fever take measles, and on the outbreak of the rash of the latter a relapse of scarlet fever occur. The writer next describes the hybrid measles-scarlatina rash, but as this is more fully gone into in the next abstract, we omit further reference to it here. Pospischill has also seen so large a number of cases of scarlet fever *plus* varicella as to be forced to believe that the latter, too, predisposes to the reception of the scarlatinal poison. It sometimes happens that measles-scarlatina cases come under observation only after the scarlet fever rash has gone; such patients often show the symptoms of septic measles. In the same way, varicella-scarlatina may give the picture of chicken-pox complicated with a septic infection—high fever, prostration, a hæmorrhagic eruption, etc. The writer records several such cases successfully treated with Moser's scarlatina-streptococcus serum. He thinks that the overwhelming majority of cases of generalised streptococcus infection following measles and varicella are really scarlatinal, and that this is of practical importance seeing that we now possess an active scarlatina streptococcus serum. The same remarks apply to acute hæmorrhagic nephritis following measles, Rötheln, and varicella.

Antitoxin Rashes and Scarlatina.—Very soon after the introduction of the serum treatment of diphtheria, a group of cases characterised by fever and scarlatiniform eruption, tending to occur in small epidemics among those treated with antitoxin in hospitals, etc., became recognised. At first these were grouped along with other serum rashes, but it has recently been shown that many of them are secondary infections with scarlatina. The frequency with which cases of diphtheria under treatment with antitoxin become infected with scarlet fever has been ascribed (1) to the wound made by the injection syringe ("surgical scarlet fever"), and (2) to the non-recognition of the true nature of the condition and to defective isolation. Pospischill expresses the belief that the frequent double infection is due to an increased susceptibility to scarlet fever resulting from the use of serum. This idea is confirmed by the fact that when he began to use Moser's scarlet fever streptococcus serum the same thing took place—the patients treated with it often had relapses at the time when the general effects of the serum tend to become manifest. The increased susceptibility is, he thinks, due to the eruption and constitutional symptoms caused by the injected serum. Ordinary relapsing scarlet fever is due simply to the

reinfection of a convalescent patient by a fresh case in its neighbourhood, and is predisposed to by, among other things, injections of serum.

On Cases of Combined Measles and Scarlet Fever (Hukiewicz, *Jahrb. f. Kinderheilkunde*, May 1st, 1904).—In this article the writer discusses: (1) the regular course of the dual infection; (2) the diagnosis of the condition; and (3) the question whether the one infection predisposes the patient to the other. His paper is based on twenty-one cases seen during an epidemic of measles between November 1902 and May 1903—a number which in itself goes to prove that the combination is not a very rare one. To clear the ground, we may first say that, apart from the eruption, the symptoms of the two diseases run their usual course. The rash alone, therefore, claims attention. The cases fall into three groups: (1) those in which scarlet fever preceded measles; (2) those in which measles preceded scarlet fever; and (3) those which first came under observation at such a stage that the sequence of events could not be determined. Before describing the eruption, it will be well to lay down these general principles: (1) the two eruptions may pursue their courses side by side without interfering with each other, or they may affect each other only to the extent that one temporarily conceals its neighbour; (2) on the other hand, a totally new rash may result, and in this fashion: when the scarlatinal rash comes out soon after the measles rash has begun to appear, a hybrid rash develops *in those parts of the body where the measles rash has almost attained its maximum development*, while on the areas of skin where it has begun to fade, or where it has not yet appeared, the two rashes pursue independent courses. These principles are not explicitly stated by the writer, but we think they may be correctly inferred from his description of his cases, and they certainly supply a key to what follows. The recognition of the first group of cases—scarlatina preceding measles—is easy when the course of the eruptions can be watched. In the second group—the converse of the above—the diagnosis is easy when the two eruptions do not affect one another; more often, however, it is difficult, if what commonly results—the *hybrid rash*—be unfamiliar to the observer. This hybrid rash has so far escaped notice, or at least explanation, in the literature of infectious diseases. It has the following *character and course*: It is situated on the body or extremities, never on the face, and consists of large, slightly raised, glossy, bright brick-red patches, the size of the palm of the hand or more, with irregular outlines, separated from each other by narrow, undulating strips of healthy skin. It is quite unlike any of the

exanthemata, and from its wavy outline and somewhat turgescent appearance resembles confluent urticaria, though of dissimilar colour. It is further characterised by its extremely *fugitive nature*: a typical measles rash *nearing the stage of complete evolution* may give place to this eruption in the course of an hour or two; in a few hours more the eruption becomes less raised, paler, and when it has sunk to the level of the skin the punctate redness of the scarlatina rash is seen, which, dying away in its turn, leaves behind only the now fading measles rash. It is noteworthy that at its first appearance the scarlatinal rash spares the areas of skin between the urticaria-like patches. When once this characteristic hybrid eruption develops, the rashes elsewhere behave like other double infections, *i.e.* the scarlatinal rash temporarily conceals the exanthem of measles, and when it dies down the fading measles spots can be seen. This sequel to the hybrid rash is a valuable confirmation of the diagnosis.

As to the effect of the double infection on the gravity of the illness, the data are too limited to yield definite information. Of the author's twenty-one patients, seven died, a mortality of 33 per cent. compared with a corresponding death-rate of 20 per cent. for measles and 12 per cent. for scarlet fever during the same epidemic. Of the fatal cases, four died of pulmonary complications, and three with severe scarlatinal symptoms. Of the fourteen patients who recovered, most had mild symptoms throughout, but three had bad attacks of scarlet fever. It thus appears that on the whole the scarlatinal infection is the chief factor in determining the gravity of the condition.

The writer, considering the short incubation of scarlet fever, concludes that measles, during the second half of the incubation period and the prodromal stage, predisposes to infection with this disease. The opinion is based (1) on the relatively large number of cases he has seen compared with the infrequency of the association of scarlet fever with other infections (varicella, however, excepted); (2) the development in two six months old infants of scarlet fever during the eruptive stage of measles—this being an age at which scarlet fever is very rare; (3) the occurrence of relapses of scarlet fever during the eruptive stage of measles.

Post-Vaccinal Eruptions.—From an exhaustive review of this subject by Courtellement (*Gaz. des Hôpitaux*, Dec. 12, 1903) the following is abstracted. Post-vaccinal rashes are more common in summer than in winter, after primary than after second vaccinations, and chiefly affect weakly children. They are not true generalised vaccina, the exudation from the bullæ

being incapable of reproducing the vaccine vesicle. Their connection with vaccination has been totally denied; they have been ascribed to reflex nerve influence, to secondary infection from the use of bad lymph, and, while they are probably toxic, the individual factor seems to play an important part in their occurrence. Their appearance usually coincides with the maturation of the vaccine vesicle, and they tend to occur near the site of inoculation, whence they spread over the body, sparing, however, the mucous membranes. Polymorphism is a frequent character, different rashes succeeding one another, or, more commonly, several types being present simultaneously. With the exception of urticaria, none of the rashes give rise to local irritation, and general symptoms are also, as a rule, absent. The eruptions are of short duration—from a few hours to a few days. The following clinical types occur: — I. *Erythemato-papular*—the most common type, which may be: (1) erythematous: (*a*) simple isolated spots, (*b*) morbilliform, (*c*) scarlatiniform; (2) papular: (*a*) lichen strophulus, (*b*) erythema multiforme, (*c*) syphiloid variety, resembling the rash of congenital syphilis in appearance and distribution; (3) erythema nodosum (exceptional); or (4) urticaria, usually associated with some other type of rash. II. *Vesiculo-bullous eruptions:* (1) miliaria, one of the commonest post-vaccinal eruptions; (2) zona (rare); (3) bullous rashes or vaccinal pemphigus, often in cachectic infants; (4) combinations of bullous, vesicular and papular rashes, *e.g.* herpes iris. III. *Purpura*—this is rare; it may take the form of p. simplex, or p. hæmorrhagica. IV. *Constitutional skin diseases*, especially eczema and psoriasis. From a practical point of view, it is undesirable to vaccinate weakly children or those already affected by a skin disease. The only post-vaccinal rashes in which the prognosis is not absolutely good are vaccinal pemphigus and purpura hæmorrhagica, especially in cachectic infants.

Editorial Notes and News

The Teaching of Hygiene.

THE petition advocating the teaching of hygiene in schools which was recently circulated among members of the profession received the signatures of 14,718 registered medical practitioners. It will be remembered that this petition stated that the signatories, having constantly before them the serious physical and moral conditions of degeneracy and disease resulting from the neglect and infraction of the elementary laws of

hygiene, urged the educational authorities to consider whether it would not be possible to include in the curricula of the public schools such teaching as might lead all the children to appreciate at their true value healthful bodily conditions as regards cleanliness, pure air, food, drink, etc.

This petition has now been presented to the educational authorities by an influential deputation, which was received at the Education Office on June 11th by Lord Londonderry, the President of the Board of Education.

The deputation was introduced by Dr Farquharson, M.P., and Sir William Broadbent. Sir Thomas Barlow, Sir Lauder Brunton, Sir Victor Horsley, Dr Mary Scharlieb, and others, spoke in support of the petition.

Lord Londonderry, in replying, said there were certain difficulties which would prevent him giving a very definite answer to the very definite proposals of the petition. Amongst these was the fact that properly trained teachers did not exist at present, but the Department was endeavouring to secure the training of such teachers. He would also have to await the report of the Commission appointed by the Duke of Devonshire to inquire into the physical condition of the people before knowing exactly which remedies were necessary, and there might be other Departments with which it would be necessary to co-operate. His Department had not only endeavoured to secure the training of teachers in this matter, but they were about to issue a volume containing practical instructions in the subject. The deputation would therefore see that those responsible had "taken the bull by the horns," and were endeavouring to do something practical in the matter.

Sir Wm. Turner, K.C.B.

WE are informed that the rumour that Sir William Turner is resigning the Presidency of the General Council is correct, and that he will only once more be present at the Council over which he has so long and so ably presided. It will not be easy to find a suitable successor. Other things being equal, it must be admitted that it is preferable that the President should reside in or near London, if only for the convenience of office work. Sir Richard Quain was an Irishman living in London, Sir William Turner an Englishman living in Scotland, but we know of no Scotsman living in Ireland who is eligible for the post. Sir Victor Horsley would be a most popular President with the profession as a whole, but we fear he is too much "agin the Government" to be selected by the Council.

Surgical Out-Patients

ALL summer there have been rumours of radical changes contemplated in the Surgical Out-Patient Department of the Royal Infirmary. Cases of alleged neglect and delay in attention were assiduously worked up by the yellow press until many sober-minded persons grew quite uncomfortable. The managers, though they preserved a dignified silence, gave the matter their most careful consideration, and for a time it appeared that some undesirable panic regulations would be enacted. Someone, obviously a layman, suggested that one assistant-surgeon should be detailed for a period of three months for continuous work in the Out-Patient Department. He was to be free from all ward work, was to give daily cliniques to the students, and was to have almost office hours at the Infirmary. The further suggestion that he should have under him three house-surgeons, one of whom would always be in the waiting-room, ready at a moment's notice, was, if a trifle superfluous, not so unreasonable, and we understand is likely to be adopted in a modified form.

The other assistant-surgeons, relieved from all out-patient work, would be able to discharge the ward duties now devolving on the non-resident house-surgeons, who, as the new out-patient house-surgeons will do most of their work, will no longer be required.

Fortunately wiser counsels have prevailed, and a trial is to be given to a method which we have always believed the easiest solution of the question.

The assistant-surgeons will continue to follow a daily rotation, but in future they will act on their own responsibility and not merely as the deputies of the surgeon with whom they are associated. They will not be available for ward or operative assistance on their day on duty. This, we believe, has been the chief occasion of any apparent neglect, and now that the assistant-surgeon will be able like the assistant-physician to go on with his out-patients until all have been attended to, things should go more smoothly.

The Glasgow Sewage Works at Shieldhall and the Govan Parish Council.

A CASE which has some points of interest with regard to sanitary science was heard in Glasgow on July 8 and 9, under the Private Legislation Procedure (Scotland) Act of 1899. In 1898 the Corporation of Glasgow obtained powers to erect the necessary works for the treatment of sewage on a piece of ground at Braehead, on the south bank of the Clyde, rather over a mile below Govan. Recently, however,

they have been approached by the Clyde Navigation Trustees, who proposed that they should take the site known as Shieldhall, in the parish of Govan, instead, giving up Braehead to the Clyde Trustees for purposes of docks, wharfage, etc. This was opposed by certain shipbuilders in the vicinity of the Shieldhall site, and strenuously so by the Commissioners of the Govan Combination Parish Council.

The case for the promoters and opposers was heard by a Commission, the chairman of whom was the Earl of Kintore, and proof was led by counsel on both sides, Mr Salvesen, K.C., and Mr Cooper appearing for the promoters, and Mr Wilson, K.C., Mr Clyde, K.C., Mr M'Clure, and Mr M'Millan for the objectors. The points in the case, which are of special interest to medical men, are these:—The Govan Parish Council objected because the proposed works would be situated in very close proximity to certain institutions under their control, consisting of a hospital and parish infirmary, a children's home, an asylum, and poorhouse; indeed, the works will be only 96 yards from the children's home, and only 202 yards from the hospital. These buildings are all modern, and cost £178,000, and it was affirmed that there would be a real risk of impairment of the health of the inmates (who vary from 1200 to 1500) from the emanation of the sewage works, and from the dust that might be blown from them to these buildings, situated so short a distance off. The promoters produced various witnesses to prove that there would be no possibility of any nuisance, much less harm from the sewage tanks or sludge; that those who worked in such places enjoyed as good health as other people; that other hospitals had been built near sewage works; and that the School Board of Glasgow was going to erect a school within 200 yards of the Dalmarnock Works, where at present 14,000,000 gallons of sewage are treated daily.

For the opposers, it was pointed out that no good sanitarian would ever put hospitals and homes within 200 yards of a sewage works; and that, conversely, the latter should not be placed so close to existing hospitals; that though there is no great smell from such works as those at Dalmarnock, yet the air over them has a sickly odour, and is deficient in oxygen; that the variations in level of the sewage in the tanks lead to risk of drying of particles of excreta with subsequent dissemination through the air; that flies may readily be the means of conveying particles of fæcal matter from the works to neighbouring dwellings; that the loading of sludge into barges is attended by smells and scattering of dust; and that the inmates of the said home and hospital were weakly poor children and infirm

adults, with diminished resisting powers. Other important interests, however, were involved relating to the shipping and mercantile prosperity of Glasgow, which would be benefited if the change of site were made to Shieldhall, and the decision of the Commissioners was favourable to the promoters. A clause, however, was inserted, whereby the Govan Commissioners may claim compensation if they have to remove their institutions on account of nuisance or harm from the works when they are in operation.

Appointment.

AT a meeting of the Directors of the Royal Maternity and Simpson Memorial Hospital, Dr J. W. Ballantyne was elected Physician, and Drs Lamond Lackie and Oliphant Nicholson, Assistant-Physicians.

School of Medicine of the Royal Colleges, Edinburgh

AT a meeting of the Governing Board of the School of Medicine of the Royal Colleges, Edinburgh, the Secretary and Registrar, Mr R. N. Ramsay, reported that the number of students attending the school during the summer session, 1904, was 1174.

Scotland, Ireland, and the R.A.M.C.

THE following quotation from an article on the R.A.M.C. in the *Westminster Review* is too good to miss:—

"The latent talent for administration possessed by the average Anglo-Saxon is neutralised in the R.A.M.C. by the Irish and Scotch members who form the bulk of its members. The racial and national peculiarities of these two preclude them from being successful administrators. The excessive vanity of the one and the inordinate conceit of the other are quite antagonistic to that calm discussion, gentle spirit of compromise, and firm perseverance which render pure Englishmen of any rank and any degree of education such wonderfully successful and able administrators and organisers."

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DISARTICULATION AT THE KNEE AND ELBOW BY CIRCULAR INCISION[1]

By A. G. MILLER, M.D., F.R.C.S.E.,
Consulting Surgeon to the Royal Infirmary, Edinburgh

IN Liston's "Practical Surgery" I find the following sentence quoted from Desault: "The simplicity of an operation is the measure of its perfection."

Without aspiring to the claim of perfection in regard to the following method of disarticulating at the knee and elbow joints, I think that I may hope that its simplicity will recommend it to practical surgeons, and be the measure of its acceptance by the profession.

My excuse for republishing and revising my pamphlet is that several of my colleagues have spoken favourably of the operation, and that there are one or two points in regard to which I wish to modify my original method of procedure—especially in the direction of securing greater simplicity and consequently rapidity of performance.

The circular sweep of a sharp and long amputating knife can secure a clean cut down to the deep fascia in a very few seconds. The retraction of the skin on the flexor aspect of the limb is immediate and considerable if the limb be fully and forcibly extended. A few seconds more suffice for the dissecting up of the skin and cellular tissue on the extensor aspect. Disarticulation should also occupy only a few seconds.

I have not had the performance of the operation timed, but

[1] Originally published in the *Edinburgh Medical Journal* for July 1895, revised and slightly altered, with preface.

I am sure that any surgeon could complete the above-mentioned manipulations—in the case of the knee—in less than one minute without any undue haste. As there is only one large vessel to be tied (the rest can be twisted), and the stitching—continuous if need be—will not occupy more than a minute, I may fairly claim that it may be possible to complete the operation in about five minutes, perhaps even including the dressing of the stump. That this must be a great gain in the way of preventing shock, and in shortening the period of anæsthesia, is so evident as to require no comment.

In revising my original pamphlet I have had two motives. On the one hand, I have found that the one circular cut is all that is required. On the other hand, it has been impressed upon me that as this operation, at the knee especially, is required for cases, such as senile gangrene, in which rapidity of performance is an important consideration, the details of the operation should be both few and simple.

Details of Operations.

Disarticulation at Knee.

1. Circular sweep through skin and superficial fascia, 2½ inches below the condyles of the femur.
2. Dissection of anterior flap to clear head of tibia.
3. Division of ligamentum patellæ, lateral ligaments and crucial ligaments (joint flexed).
4. Remaining soft parts cut with downward sweep of knife (limb straight).

Disarticulation at Elbow.

1. Circular cut, 1½ inches below the condyles of the humerus.
2. Dissection of posterior flap, with joint flexed.
3. Disarticulation effected from the front by cutting muscles, tendons, etc., on anterior aspect, the lateral ligaments, and the tendon of the triceps last of all.

The circular method of amputating is easy of performance, and has been adapted, with various modifications, to many parts of the limbs; but the procedure which nowadays is most in favour is the single flap—the more cutaneous the better—and this method is the best where it can be adopted.

The amputation which I recommend, and which I have employed successfully in several instances at the elbow and knee, secures a long single flap by a circular cut. This may sound somewhat strange and contradictory to some, but will not seem remarkable or in any wise out of the way or contradictory to the experienced surgeon.

The whole point and simplicity of the procedure depends on the well-known tendency to contraction of the soft structures on the flexor aspect of a limb, as compared with the extensor, after the tissues are divided. At the elbow and knee this tendency is increased by extending the joint, and thus putting the skin on the flexor aspect on the stretch, while the skin on the extensor surface is completely relaxed.

The method of procedure is this:—The limb being held out quite straight, a circular incision is made below the condyles (1½ inches in the arm and 2½ in the leg), down to the deep fascia. The skin on the flexor aspect (anterior in arm and posterior in leg) at once retracts considerably, making the line of incision oblique.

The extensor flap is now dissected up as far as the head of the tibia in the leg, and to above the olecranon in the arm, care being taken to cut on the deep fascia, and so to reflect the subcutaneous cellular tissue and its contained blood-vessels along with the skin. This flap is loose and ample, being taken from a part where the skin is naturally redundant in order to accommodate itself to the normal action of flexion. (The appearance of the elbow and knee during flexion and extension demonstrates this clearly.) After reflexion of this flap—practically the only one—disarticulation should be performed (on the arm and knee both) from the front, the patella being saved in the latter case. The semilunar cartilages will probably be removed attached to the head of the tibia. It will then be found that there is a long flap on the extensor aspect, anterior at knee and posterior at elbow, with practically no flap at all on the flexor aspect of the condyles. After the blood-vessels are secured and the nerves drawn out and cut short, this single flap folds nicely over the condyles, being, indeed, in its natural place, and is easily secured by stitches. When healing has taken place, the appearance of the stump is very natural looking and most satisfactory.

This amputation—as will, I suppose, be readily admitted—is a single cutaneous flap operation. I need not attempt to go over the old arguments that were brought forward long ago to prove the advantage of the long single flap when it can be got. Teale, Carden, and Spence have all shown the advantage of the "long anterior flap." Syme has demonstrated the advantage of the single flap at the ankle. Furneux Jordan's amputation at the hip and Spence's at the shoulder, are really single flaps fashioned very much on the lines that I have suggested for the elbow and knee, with a slit added to permit access to the joint for disarticulation.

I take for granted that the single cutaneous flap is the best when it can be got. I take for granted also that disarticulation at the elbow and knee is better than amputation above these joints. The old objections to leaving articular cartilage and synovial pouches, provided they are healthy, no longer hold, for since the introduction of antiseptics, suppuration of an amputation wound is rare. Most authorities on operative surgery in the present day rather favour a return to disarticulation because it is simple, does not necessitate the use of a saw, and provides a longer and better stump than any amputation higher up. The method of disarticulation that each recommends, however, varies considerably.

Joseph Bell prefers a long anterior flap at the elbow, because the circular or oval is apt to be too short, and ultimately to adhere to the end of the bone. At the knee he thinks that disarticulation is not likely to be required or appropriate in the majority of cases; but when it is necessary he advises a long anterior flap. Jacobson approves of disarticulation at the elbow and knee joints, and in the former situation gives five methods. The circular is one of these, but he describes the "cuff" method, which is a difficult operation. He prefers the long anterior flap procedure. For disarticulation at the knee he recommends lateral flaps, and does not mention any circular method.

Treves says a great deal about disarticulation at the elbow and knee, and seems to prefer the procedure to amputation higher up. For the elbow he describes four methods, the circular and "elliptical" being two, though they are practically the same. He prefers the "anterior ellipse," which gives a long

anterior flap. He admits, however, that a great amount of skin is necessary. For disarticulation at the knee Treves describes three methods, the "elliptical" being one, which closely resembles the method I am advocating. He prefers lateral flaps, however.

Treves considers that a long flap taken from the extensor aspect of the elbow may be deficient in vascular supply. As this does not agree with my experience, I asked my friend Mr Whitaker, Lecturer on Anatomy at Surgeon's Hall, as to the nature of the vascular supply to these parts. He made special dissections, which he kindly showed me lately, and which demonstrate that the vascular supply is remarkably good. Two large vessels are supplied to the skin on the dorsal aspect of the elbow, one coming from the inferior profunda and anastomotica on the inner aspect, and the other from the superior profunda on the outer aspect of the joint. These vessels course in the subcutaneous cellular tissue, and thus the importance of reflecting the cellular tissue with the skin, as enforced by my old master Mr Spence, for all skin flaps, is demonstrated.

Kocher[1] describes only the oval or oblique incision for disarticulation at both the elbow and knee. The method is almost identical with my own, the only difference being that he slightly *flexes* the limb and makes an *oblique* cut, while I advise *extension* of the limb and a *circular* cut. The latter is, in my opinion, the easier method.

As I have already indicated, the circular incision requires, at the elbow, to be made only about 1½ inches below the condyles. It is necessary, of course, to have enough flap to cover the condyles. If you make a mark round the forearm 1½ inches below the condyles, with the arm extended, and then flex the elbow completely, it will be seen that the anterior portion of the line has slipped up on to the upper arm, while the posterior portion comes up above the level of the condyles, even with the olecranon in position—which, of course, is dissected out in disarticulation. It is quite evident, therefore, I think, that a low amputation or much skin is not necessary for this operation, and that therefore it is likely to be useful and appropriate in many cases.

[1] Kocher's "Operative Surgery." Translated by H. J. Stiles, F.R.C.S.E., May 1895.

In regard to disarticulation at the knee, the favourite methods are the long anterior and two lateral flaps. My method provides a long anterior flap with practically one cut, and with little trouble in the way of measurement. Besides, the point at which the circular cut is made is not so low as that necessary in Stephen Smith's lateral flap operation by at least an inch. The method should therefore be more suitable than either the long anterior or bilateral methods. The one point of importance is to have the leg fully extended, for by this means provision is made for looseness and length in the anterior flap, and immediate and considerable retraction on the posterior aspect.

I have made the condyles (humerus and femur) the points from which to measure in making the incisions, because, in performing disarticulation at the knee and elbow, I keep always before me that I have got to cover the condyles, or else to saw them off. If the flap turns out to be long enough, disarticulation is possible. If, however, the flap does not cover the condyles properly, some portion of the latter will have to be sacrificed. Keeping this in view, it is not difficult generally to gauge the amount of skin necessary, and the exact point at which it is safe to apply the knife.

The cicatrix in a circular amputation is said to be usually central, and to be apt to adhere to the end of the bone. In this modified circular amputation the cicatrix is not, and cannot be, central. It is well up on the flexor aspect, neither is there any chance of its becoming adherent to the bone. This result is due, as has been demonstrated, to the unequal retraction of the soft parts that takes place on the flexor and extensor aspects. And this inequality is made certain by fully and forcibly extending the joint before the circular incision is made. Let it be remembered, at the same time, that the primary incision being circular, a certain amount of skin is provided on the flexor aspect to meet the great tendency to retraction, and that, consequently, *a very great amount of skin is not so necessary on the extensor aspect.* The method is practically a utilisation of the natural tendency to unequal retraction of the soft parts at the elbow and knee to frame a long anterior flap, by the simple performance of one circular cut.

In advocating the employment of this circular amputation

at the elbow and knee, I do not for a moment suppose that I am suggesting a new method. What I am recommending is simply an adaptation of an old method. It has, I believe, the following advantages besides the ordinary well-known and recognised advantages of a single long skin flap, and of disarticulation :—

1. The procedure is simple, is easily and quickly performed, and there are no elaborate details to remember.

2. The skin flap from the extensor aspect is well accustomed to pressure and to the situation in which it is ultimately placed over the condyles.

3. The cicatrix is in a most favourable position.

4. Much tissue is not required. The operation is therefore suitable for both primary and secondary amputations.

A CASE OF FIBROID PHTHISIS; BEING A SUMMARY OF A CLINICAL LECTURE DELIVERED IN THE ROYAL INFIRMARY, EDINBURGH

By ALEXANDER JAMES, M.D., F.R.C.P.E.

WHENEVER in the body there occurs destruction of the normal tissue or parenchyma of a tissue or organ, that portion of tissue or organ is not replaced, but healing is to a greater or less extent effected by contraction and the formation at the part of fibrous tissue. Thus destruction of a portion of skin leaves fibrous tissue and a cicatrix. Destruction of a portion of liver or kidney, lung or brain, leaves also fibrous tissue, and the result of efforts, more or less complete, at cicatricial contraction.

Similarly is it the case if this destruction is the result not of some sudden destroying force but of some more gradually acting factor. Thus if some toxin is for months or years carried to liver or kidney, there occurs a gradual destruction and disappearance of proper liver or kidney parenchyma, and a replacement of this by fibrous tissue. Similarly also with other tissues and organs, in the brain and cord we get different forms of sclerosis, in the skin we get scleroderma, in the heart we get fibrosis with usually some simple adipose tissue thrown in. In the arteries and lungs we get among other changes the more complex and elaborate elastic tissue replaced by white

fibrous tissue. Whatever be the toxin and whatever be the tissue the main result is the same; in nature the factors are manifold, the results are one.

Next notice that fibrosis in the lung and in such an organ as the liver shows itself up differently as the result of differences in the mechanical conditions under which these organs are placed. In a typical case of liver cirrhosis the organ is shrunken and very small. This is because, surrounded for the most part by yielding tissue, the liver can shrink and contract easily. The lung on the other hand is placed in a comparatively unyielding case, the thorax, so that it cannot so readily shrink and contract. Further, in addition to blood-vessels the lung has in it bronchial tubes and pulmonary vesicles communicating freely with the outer air, and containing in them air which, as in coughing, may be pent up under considerable pressure. Hence in fibrosis of the lung there is not only shrinking and dragging in of its surface and of the parts around, but also and as the result of this shrinking, a dragging out of bronchial walls and air cells. Further, this shrinking and dragging in of its surface and parts around will be apt to be most marked at the lower parts of the chest where the parietes are most yielding, whilst the dragging out of air cells to form emphysema will be most marked at the upper parts where the parietes are more rigid. Naturally these two will vary according to the part of the lung where the fibrotic change happens to be most marked, but *caeteris paribus*, falling in of chest walls will be more marked below, and emphysema will be more marked above.

Then as regards dilatation of the bronchi, although this also must vary as regards position with the locality of the fibrosis, it is evident that the larger size of the tubes in the lower lobes of the lung will be at any rate one factor in rendering them more liable to dilate.

In the ward at present there is a patient whose case I believe is one of bilateral lung fibrosis, with its associated shrinking of chest wall, emphysema, and tube dilatation. It is one of sufficient importance to merit being recorded.

John G., æt. 15, a butcher, was admitted to Ward 31, June 16, 1904, complaining of shortness of breath and stating that he had been ill for six months.

He told us that his illness had started at the beginning of January last. One Sunday at that time he was out walking, when he became chilly, sick and ill. He did not vomit, but he had to sit down and rest for a few minutes. He managed to get home fairly comfortably, but he still felt ill. He had frontal headache and he noticed that his sight was dim. On standing he felt quite giddy. He distinctly says he had no shortness of breath, palpitation nor cough at that time. The following day he was much the same, and remained in bed The next day he felt a little better, but he began to cough. This cough continued for some days, but it was not till after about a week that he had any expectoration. This was yellow in colour, not very copious, and he never noticed any blood in it. At this time also he had some pain in the front of his chest, after a fit of coughing, but the pain was never severe. He did not sweat at night, but he fell off considerably in weight. During all this he was going on with his work and never consulted a doctor. At the end of January he was a good deal better, but he noticed that he was becoming more short of breath. Since the middle of February he has noticed that he was getting very weak. This feeling of weakness and shortness of breath has persisted and become aggravated, so that he became unfit for work and applied for admission to the Infirmary.

Previous Health.—He had scarlet fever when five years old, measles in infancy, whooping-cough at the age of six. He gives no previous history of bronchitis, pleurisy or pneumonia.

As regards social conditions, he has a good home and has always had abundance of good, nourishing food. He does not smoke nor take alcohol.

As regards family history, it is noteworthy that his father had died, aged fifty-two, as the result of repeated attacks of pleurisy, otherwise the family history is fairly good.

State on Examination.—Patient is a rather delicate-looking boy, somewhat thin and anæmic-looking. Height, 5 ft. 5½ in.; weight, 7 st. 7 lbs. His temperature varies between 97° F. and 100° F.; his pulse is usually about 112, and respirations about 28.

Respiratory System.—He has no shortness of breath when lying in bed. On slight exertion, such as walking at a quick

pace or going upstairs, he becomes very short of breath. His breathing, though quick, is not laboured. At present the rate is 28 per minute. He has no pain nor cough.

On inspection, the chest anteriorly is markedly flat and shrunken in appearance on both sides. There is no hollowing of the apices, but the right infra-clavicular region is more flattened than the left. The angle of Louis is fairly well marked, and there is a drawing in of the lower part of the sternum on inspiration.

On inspection, posteriorly, the right scapula is a little lower down than the left. The spinal column shows a fairly well-marked convexity towards the left in the mid-dorsal region. The general type of breathing is thoracic-abdominal, with a large element of the abdominal in it. The expansion of the chest at the level of the nipples is only ½ in.; that is to say, on full expiration the circumference is 28 in., on full inspiration 28½ in. The expansion of the left side is rather greater than that of the right.

On palpation the vocal fremitus is found to be diminished anteriorly, especially on the left side. Posteriorly over the upper part of the chest the vocal fremitus is greater on the right than on the left side. At both bases the vocal fremitus is markedly diminished, especially on the right.

The percussion note of the whole chest is unsatisfactory. Anteriorly over the upper part of the chest the note is duller on the right side than on the left. Posteriorly, from the inter-scapular region downwards, the note is dull on both sides. At the right base the note is especially dull.

On auscultation, it is found that over both upper lobes anteriorly and posteriorly the breath sounds are broncho-vesicular in character, but distant, the bronchial element being more marked at the right apex. Over both bases posteriorly they have the same broncho-vesicular character, but are specially distant and feeble. There are no accompaniments anywhere. At the bases the vocal resonance is diminished, especially on the right side.

Circulatory System.—As stated, he complains of shortness of breath, but he has no pain, palpitation, nor faintness. His pulse, 112 per minute, is fairly well sustained.

On inspection, diffuse pulsation is noticed over the præcordia,

evidently produced by the retraction of the chest wall. The apex beat is visible in the fifth interspace half an inch internal to the left nipple.

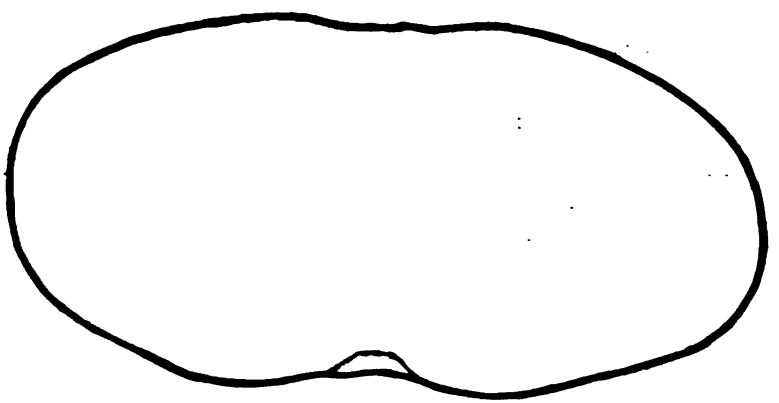
On percussion the heart is found to be of normal size, and as regards its position, slightly displaced to the right. On auscultation the sounds are found closed in all the areas; they are rather loud, and there is some accentuation of the pulmonary second sound.

Alimentary System.—His appetite and digestion are very good, and he has no abnormal thirst. On examination of the abdomen it is found to be enlarged in the epigastric and right and left hypochondriac regions. On palpation this enlargement is found to be due to the liver, which projects far below the lower costal margin. On percussion the lower limit of the liver in the nipple line can be found nearly as low as the umbilicus.

Hæmopoietic System.—There is no abnormal enlargement of lymphatic glands in any region. The spleen is not enlarged. The blood examination gave 3,560,000 reds with 5000 white corpuscles, and Dr Goodall gave the percentage of these as follows:—Polymorphs, 78; lymphocytes, 19; eosinophils, 3.

The urinary and nervous systems present nothing abnormal.

Posterior.



Anterior.

The cyrtometer tracing taken at the level of the lower end of the sternum is annexed, and the little indentation in front

represents the inspiratory indrawing. The measurements were —transversely 10¾ in. and antero-posteriorly 5 in.

The skiagraph shows: (*a*) the chest wall shrinking, rather greater on the right side; (*b*) the associated slight lateral curvature of the vertebral column; (*c*) the heart shadow proportionately rather more seen on the right side than is normal; and (*d*) the darkening over both lungs, most marked at the lower parts and specially at the right base.

Finally, it has to be mentioned that repeated exploratory punctures over different parts of the lower lobes posteriorly revealed only the existence of dense and thickened pleural or lung tissue.

Here, then, is a patient in whom we believe there is fibrosis of both lungs, causing great shrinking and contraction, and producing great immobility and drawing in of the lower part of the thorax, with a certain amount of emphysema and a rather less degree of drawing in of the upper parts. We believe that there is also some general dilatation of the bronchi, not, however, very much, because we have no history of the chronic bronchial catarrh, which is a practically constant associate of bronchial dilatation. There is certainly, however, a thickened and extensively adherent pleura.

The heart is not markedly displaced to the right side, a fact which can be understood when we remember that the shrinking process is nearly the same in both lungs. The diaphragm is probably somewhat drawn up, and as regards the liver, its very low lower border is probably due to two causes. The first of these is: that it is somewhat enlarged from congestive backward pressure; the second is: that it is out of position as the result of the lessened size of the lower part of the thorax having pushed it down, just as a liver may be pushed down by tight lacing.

What, now, is the cause of this lung condition? In his book on *Fibroid Diseases of the Lung*, the late Sir Andrew Clark has discussed the etiology of the disease, and has given the following list of causes:—

(1) Broncho-pneumonia.
(2) Acute croupous pneumonia.
(3) Prolonged chronic bronchitis.
(4) Pleurisy.

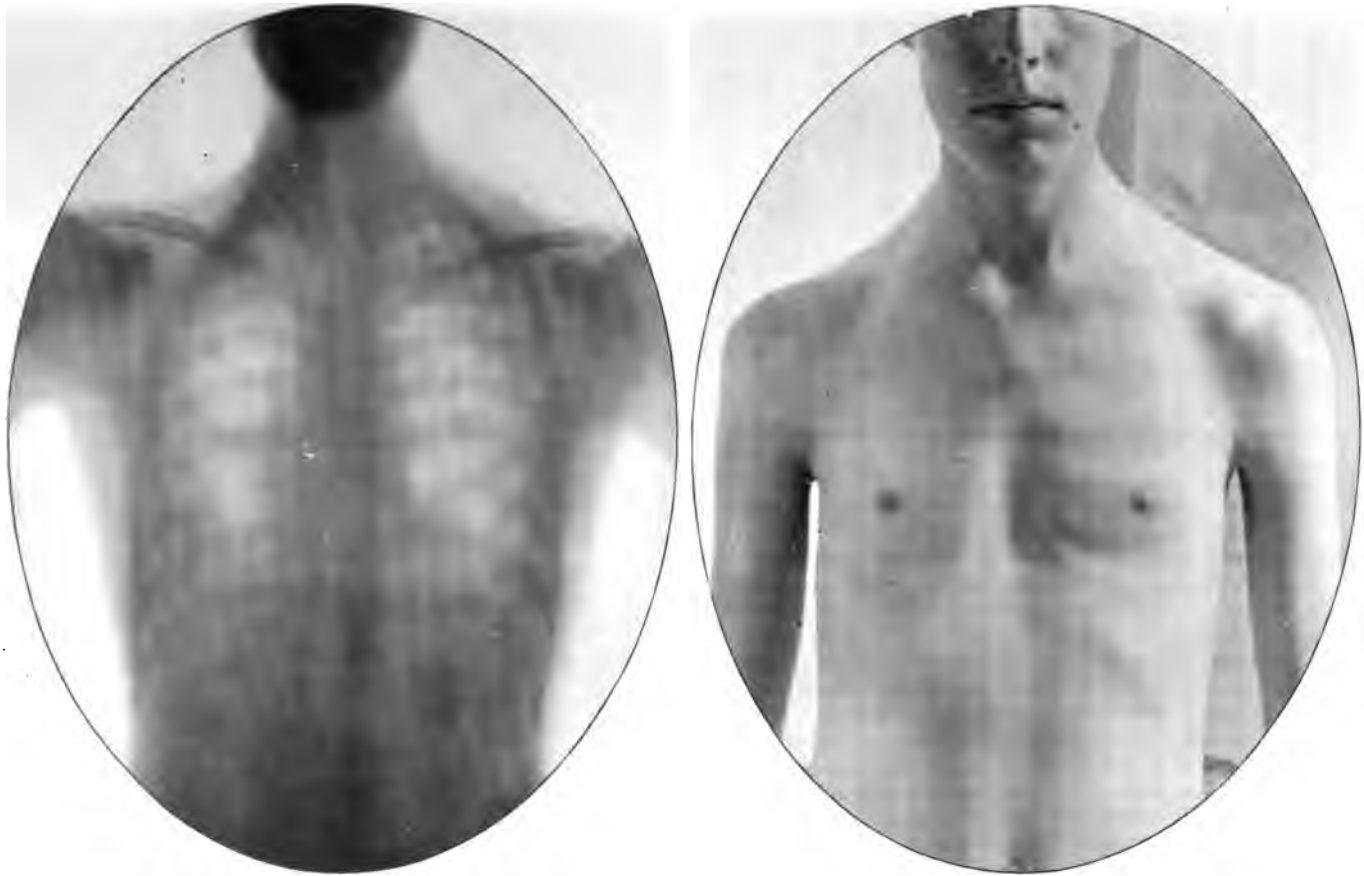


PLATE IX.—TO ILLUSTRATE DR JAMES'S ARTICLE.

(5) Inhalation of irritating dust.
(6) Collapse of lung.
(7) Syphilis.
(8) Bronchiectasis.
(9) Traumatic causes.
(10) Fibroid diathesis.
(11) Alcohol.

He further has quoted a great many cases illustrative of the disease occurring both bilaterally and unilaterally, and it is noteworthy that practically all the bilateral cases quoted give a history of long-standing bronchitic attacks.

In our patient, however, this has assuredly not been the cause. Further, as factors we can, I think, also exclude (5) Inhalation of irritating dust, (6) Collapse of lung, (7) Syphilis, (9) Traumatic causes, and (11) Alcohol. We can also, I think, exclude (8) Bronchiectasis. Our patient presents no evidence of this in his symptoms, and, moreover, bronchiectasis is, I believe, a condition which should be regarded, at any rate primarily, as an effect rather than a cause of fibrosis. In this way, then, we are limited to (1) and (2) some form of pneumonia, and (4) pleurisy, both acting in a patient with what is rather vaguely termed (10) the fibroid diathesis.

As regards pleurisy there is no doubt that a bilateral attack with slight effusion, and followed by great pleural thickening, might explain the condition, and especially if we assume the existence of the before-stated fibroid diathesis. On the other hand, an attack of broncho-pneumonia, which would almost certainly be associated with a certain amount of pleurisy, might lead in a patient of this diathesis to a similar morbid change. We can easily enough understand that patches of such occurring at different parts of the lung, and especially in the lower lobes, could lead to fibrosis and thickened pleura.

When, however, we refer to his description of his own illness, we find in connection with the symptoms very little to guide us. The absence of severe chest pain, and the development after an interval of cough and spit is, however, rather in favour of a pneumonic condition than of a pleurisy. In either case, we must assume, as stated, the existence of this fibroid diathesis. Attacks of broncho-pneumonia do not ordinarily lead to so much fibroid change, and pleurisy, although often

enough followed by great thickening of the pleura, dilatation of bronchi, emphysema, and fibrosis, does not as a rule produce the last of these to anything like the extent present in this case.

As to what this fibroid diathesis is, we cannot say more than that it probably means that a patient has, as far as this or that organ is concerned, a low trophic power. One of the most striking examples of this which I have ever seen occurred in connection with a family of eight children, in which three, on coming to the ages of puberty and adolescence, had successively developed large cirrhosis of the liver. In our patient, in this connection, it is interesting to observe that the father had died of pleurisy at the age of fifty-two.

The question may be asked here: Is the lung condition tubercular? Believing, as I do most emphatically, that the potency for harm of the tubercle bacillus is subordinate to the power of tissue nutrition, and recollecting that the tissue nutrition power in this patient is low, I think it extremely likely that the bacilli have found resting-places in his lungs for some time. They are not, however, at present leading to any marked destruction of tissue. Moreover, although our patient has no spit which we can examine, it is certainly the truth to say that in the majority of marked and long-standing examples of fibroid lung disease which we meet with, the spit remains absolutely free in this respect.

The blood examination in some cases might make us suspicious of tubercle, and of course the tuberculin test might give us information. In this case, however, I do not consider that its employment would be justifiable.

Finally, as regards prognosis and treatment. Regarding the disease as being mainly the result of lowered trophic power, there is no doubt that freedom from work, strain and exposure, good hygienic surroundings, fresh air and general tonic treatment can produce great improvement. Indeed, in the few weeks during which he has been with us, he is and feels himself greatly improved both as regards strength and breathing difficulty. He has been getting cod oil with Parish's Syrup and the Syrup of the Iodide of Iron, and he has gained about 7 lbs. in weight. The physical signs in the chest are also better, so that we may assume that the morbid process has been to a con-

siderable extent arrested, and the morbid tissue conditions to a certain extent improved. Unfortunately, however, he cannot permanently enjoy such surroundings and care.

URANIUM IN THE TREATMENT OF LUPUS

A Preliminary Note

By NORMAN WALKER, M.D., &c.

SOME months ago in looking over some of the numerous journals which come under my editorial notice, my attention was attracted by a series of skiagrams taken by prolonged exposure to a couple of old incandescent gas mantles. These consist mainly of Thorium, one of the feebly radio-active metals.

In a now considerable experience of radio-therapeutics I have constantly felt the responsibility that lies on the administrator in the narrow margin between doing enough and doing too much. It is not easy in treating large numbers of patients to ensure that a half minute more or less than is prescribed is not administered, and yet the difference is important. In the use of the rays on a large scale one has to be constantly on the watch, and it is only large experience that enables one (and that not always) to decide whether treatment may be continued in spite of a certain amount of reaction or whether it must be given up for a time. When radium is used the margin of safety is wider, though here too all workers are agreed that the effects are curiously varied.

And there is a further consideration which I think deserves more attention than it generally receives, viz., the time occupied by the patients in waiting their turn for treatment. We have tried many time-table systems, but none of them has prevented considerable loss of time. It is all very well to say that the treatment is so important that this need not be considered. But most hospital patients have to make their living, and when one reckons in addition to the time spent in hospital that occupied in coming and going, it is obvious that a lenient employer is a very important factor in the treatment.

I therefore resolved to investigate the therapeutic action of Thorium, and set about designing methods of its application.

In Mr Alexander, Principal Dispenser to the Royal Infirmary, I found a most enthusiastic co-worker, and I have to thank him not only for his invaluable help, but also for the photographs which illustrate this paper. After a short trial of Thorium we discarded it in favour of Uranium, which, as is clearly shown in the skiagraphs, is much more radio-active.

The skiagraphs were taken by laying two strips of lead foil crosswise between the plate and the plaster, and exposing for varying periods. A selection of these is shown on the plate.

Description of the Method of preparing the Plaster by Mr Alexander.

An oxide of uranium is first prepared from one of the readily obtainable salts, such as the nitrate, and incorporated with a negative base, *e.g.* rosin or beeswax. The plaster leather having been prepared, a layer of the plaster of the usual thickness is applied of any desired extent. This is quickly covered with waxed paper gummed at the edges to enclose it completely.

Arguing from the photographic effects, I concluded that if one took five minutes as the mean exposure to the X-rays, and an hour as that of the specimen of radium which is in use in our department, it was apparently safe to make very prolonged applications of the uranium plaster without any appreciable risk.

I used it in the first instance on cases where the limbs were affected, though I am, of course, well aware that these form no very severe test of any remedy. The results were very gratifying, patches of fibroid lupus on the arms improving steadily under the plaster. At first we applied it for twenty-four hours only; later applications of as much as three days and nights were found to be followed on the arm by no reaction. On the face, which was next treated, it was found that a slight reaction followed in some cases when the exposure exceeded twenty-four hours. But since the plaster is a somewhat prominent form of dressing it is now our custom in out-patients to direct that the plaster be applied at night and removed in the morning. At first we applied it directly to the lupus, but the discharge soiled and tended to crack the plaster, and having satis-

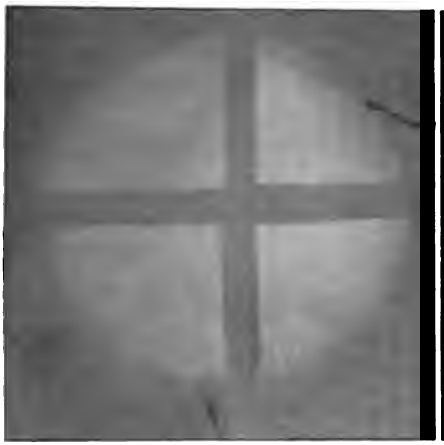


FIG. 1.—Thorium. 48 hrs.

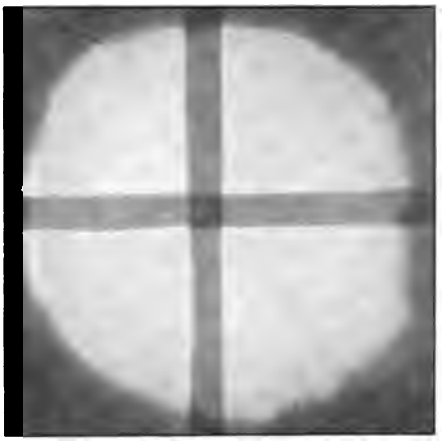


FIG. 2.—Uranium. 48 hrs.

FIG. 3.—Uranium: through thick black paper. 48 hrs.

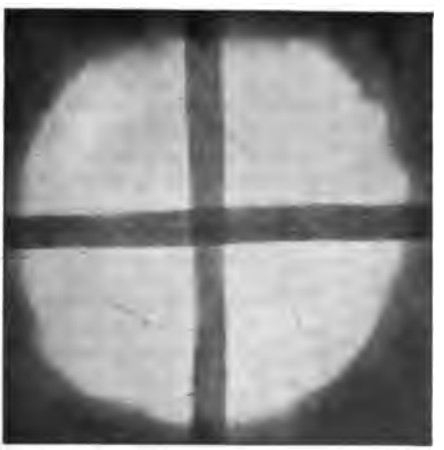


FIG. 4.—Uranium plaster: four months old. 24 hrs.

PLATE X.—TO ILLUSTRATE DR NORMAN WALKER'S ARTICLE.

fied ourselves by skiagraphs that there was no interference with the rays we now enclose the plaster in waxed paper. Fig. 4 shows that the plasters may be used for months without losing their activity, a matter about which we were for a time in doubt.

The success of the application is very encouraging; apparently the risks are negligible, and the convenience to the patient is great. Lastly, to us in Scotland at least, the method has the great merit of economy. We cannot, of course, say what the retailers may charge, but Mr Alexander's estimate is that the plasters can be made for the sum of one shilling. As our experiments show that a plaster is quite active after four months' use, it may be admitted that it will be hard to find a cheaper method of treating such cases of lupus as are suitable for it. I hope to publish more detailed results later.

THE SURGERY OF THE INTERNAL JUGULAR VEIN

With Special Reference to Inflammatory Affections of the Mastoid

By JAS. H. NICOLL,
Consulting Surgeon, Glasgow Ear Hospital, etc.

THE two following recent cases are selected, from a number, as typical. They illustrate the advantages, in dealing with inflammatory disease in the mastoid process and cavities, of making the ligature, or excision, of the jugular vein in the neck the *primary* step in operative procedure in all cases in which the surgeon has any reason to suspect that the lateral sinus may prove to be involved, either by the original disease or during the course of the mastoidectomy.

CASE I.—Gentleman seen with Dr Barr and Prof. R. S. Thomson, on August 11th. Chronic otitis media purulenta of twenty years' duration, with recent acute attack of one week's duration, with the usual symptoms of mastoid empyema, and a presumption of sinus involvement owing to repeated rigors within the preceding forty-eight hours. Co-operation was impossible owing to Dr Barr having to attend an urgent case at a distance.

Operation.—Exposure of internal jugular in lower part of neck. Vein found apparently healthy, and, in consequence, not opened or excised, but occluded by double ligature. Mastoidectomy, immediately following, demonstrated the following conditions :—Sclerosis of mastoid bone—empyema of antrum and cells — extradural abscess in both middle and posterior fossæ of skull—and purulent thrombosis occluding lateral and sigmoid sinuses for a distance of about two inches. The sinus was opened and the thrombus cleared out—the exposure and opening of the sinus being continued back along the lateral sinus until the end of the thrombus was reached. The patient is at present, one week after operation, progressing favourably.

Comment.—It is obvious that in this case, had the jugular not been previously ligatured, the operation carried out for the relief of the condition might very readily have become the means of precipitating a fatal issue. The necessary manipulation of the thrombosed sinus in the process of removing the bone surrounding it, and clearing out the extradural abscess in its neighbourhood, followed by the breaking up of the thrombus and its removal by the spoon, constitute conditions under which exceptionally good fortune alone could prevent aspiration into the lungs, down the patent jugular channel, of infective debris.

CASE II.—Boy, æt. 7, seen at the Children's Hospital Outpatient Dispensary, in June last. Chronic otitis media purulenta of three years' duration, with marked fœtor, and recurrent attacks of slight puffiness and tenderness over the mastoid. Indolent enlargement of cervical glands on affected side. Family history indicating probable tendency to tuberculosis.

Operation. — Ligature of internal jugular in neck, with removal of the enlarged cervical glands through the same incision. The glands showed the typical caseation of tuberculosis. Mastoidectomy, immediately following, demonstrated extensive caries of mastoid process, with chronic empyema of the antrum. Free removal of the diseased bone resulted in piecemeal excision of the major portion of the mastoid process involving exposure and partial isolation of the sigmoid sinus for a distance of over one inch. Part of the anterior wall of the sinus presented granulation tissue, but, as no thrombosis was detected, the vessel was not opened. At the end of five

weeks packing was discontinued, and a fortnight later the operation cavity had closed.

Comment.—In tubercular children mastoid disease, as a complication of purulent otitis, commonly presents extensive carionecrotic involvement of the bone, necessitating wide and free removal, with resulting exposure of the sinus in many cases, or discovery of a sinus wall already bared by the carious process. Under such conditions, if the operation is to be radical, the sinus is exposed to the risk of accidental wounding, during the operation, or in renewing the packing at one of the many subsequent dressings. Wounding of the sinus (apart from the somewhat remote risks of fatal loss of blood and of air embolism) involves an imperfect operation owing to the welling of blood during expiratory effort, and the risk of serious constitutional results following aspiration into the sinus and jugular vein of mixed tubercular and pyogenic debris. Ligature of the vein subsequently to the wounding of the sinus cannot be held to meet the surgical requirements of the case. It involves the hurried invasion of the aseptic cellular planes of the neck by fingers and instruments soiled by the infective contents of the mastoid. And, even then, it is too late, for aspiration through the wound in the sinus wall will have been going on in many instances for at least several minutes before the ligature can be applied to the vein. In the case of a wound inflicted on the exposed sinus by probe or forceps in replacing packing while dressing the mastoidectomy cavity, the delay in ligaturing the vein will be greater, as the administration of an anæsthetic will be necessary.

The ligaturing of the jugular vein constitutes a detail in the operation of mastoidectomy, with or without opening of the sinus. As an operative procedure its risks are trivial. Case II. has been selected as illustrative partly because the patient was treated throughout as an out-patient. A considerable number have been so treated, and amongst children it is now my routine practice. At the recent meeting (May 21st, last) in Glasgow of the Otological Society, in illustration of a communication on the surgery of the lateral sinus and jugular vein, a number of patients were shown. Six of these were children, in whose cases the internal jugular veins had been ligatured, and the cases treated throughout as out-patients.

That communication, "Indications for Operative Interference with the Lateral Sinus and Internal Jugular Vein, with Illustrative Cases," will be found in the *Transactions of the Otological Society of the United Kingdom* for the current year, and may be referred to for the details of the cases dealt with.

These "indications" may lead to the carrying out of operative procedures (1) on either sinus or vein, on account of some affection peculiar to itself; (2) on either, on account of some affection of the other. The cases referred to (*loc. cit.*) were selected to illustrate such procedures. They naturally, and in this they are typical of such cases, arrange themselves as follows:—

Sinus.—(*a*) Operation on account of disease involving the *sinus itself*:—*Case* shown illustrating the necessity of laying open the sinus until the end of the infective thrombus is reached. This, in the case in point, involved exposure and opening the sinus from lower end of sigmoid to torcular.

(*b*) Operation on sinus on account of some affection of the *jugular vein*:—

1. *Case* of laceration of vein during excision of cervical glands in an out-patient. Vein injured at a point so close up to base of skull as to make ligature impracticable, and packing of doubtful security. Lateral sinus exposed through skull, and occluded by packing.

2. *Case* of operation for malignant disease in tonsil and pharyngeal wall. Preliminary control of hæmorrhage by ligature of common cartoid, and internal jugular, in neck, and exposure and occlusion of sinus in skull.

Jugular vein.—(*a*) Operation on account of some affection of the *vein itself*:—

(1) *Cases* of *accidental* wounding of the vein itself, or of its tributaries close to the main trunk. In such cases it is often better practice to expose the main trunk, and ligature at points above and below the site of the wound, than to attempt the application of a ligature in the indurated and purulent area surrounding the wound, as, for instance, in cases of excision of caseating tubercular cervical glands.

2. *Cases* of *purposive* removal of portions of the jugular vein with masses of adherent cervical glands.

(*b*) Operation on the vein on account of some affection of the *sinus* :—

1. *Emergency cases*, illustrative of ligature of jugular vein after wound of sinus, either during the course of a mastoidectomy, or in one of the subsequent dressings.

2. *Cases* illustrative of ligature or ablation of the jugular vein as part of a *deliberately planned* operation where, in the course of a mastoidectomy, the sinus is found thrombosed. Such ligatures may be applied before the patient regains consciousness, or at a subsequent operation.

3. *Cases* of ligature or ablation of the jugular vein as the *first* step in the operative treatment of cases in which there is reason to suspect that the sinus is either the seat of infective thrombosis, or is likely (chiefly in tubercular cases) to be exposed, during the removal of diseased bone, to damage during the operation or the subsequent dressings.

To this last group (3) belong the two cases forming the substance of the present communication. In all such cases it is now my routine practice to ligature, or excise, the jugular vein in the neck as a preliminary to operative measures in connection with the mastoid. A considerable number of cases so treated have yielded results which appear to warrant the following conclusions :—

1. Preliminary *ligature* of the jugular vein is an operation of trivial risk. As the primary step in the operative treatment of the case, it is performed with clean hands and instruments. Ligature of the jugular, however, undertaken towards the end of a mastoidectomy when infective thrombosis has been discovered in the sinus, or performed hurriedly after accidental wounding of the sinus, is an operation which, performed with contaminated hands and instruments, carries grave risks of septic complications.

(*Excision* of the jugular vein, on the other hand, in cases in which on exposure of the vessel it is found that the infective thrombosis has extended down the lumen, constitutes an operation of some severity, the dissection extending in most cases from clavicle to mastoid. For this the operator must on prepared, even in cases in which the symptoms have given be

indication beforehand of the condition of matters revealed by the incision.)

2. Preliminary occlusion of the jugular vein in cases in which there is reason before operation on the mastoid to suspect infective thrombosis of the sinus constitutes the patient's main chance of recovery. To disturb the walls of a thrombosed sinus in exposing it, to palpate it for evidence of thrombus, and finally to open it and break up the purulent thrombus in removing it with the spoon over a patent jugular channel, sucking in debris with each inspiratory effort, cannot be regarded as sound surgery.

3. Preliminary occlusion of the jugular vein, in cases (most often in children) in which there is reason to suspect tuberculous caries, permits the performance of a much more radical mastoidectomy than can be attained in cases where a patent jugular vein converts an accidental wound of the sinus from a comparatively trivial incident to an accident bearing serious disadvantages and grave risks. Amongst the former is the limiting of the scope of the operation owing to the welling of blood with each expiration, or the presence of the gauze plug inserted to check the flow. Such limitation is unfortunate, because cases of tubercular disease commonly return repeatedly unhealed because of remaining or extending areas of caries. Anything which hinders the operator in his endeavour to radically extirpate the caries renders further operation in the future the more likely.

Amongst the latter need not be placed fatal hæmorrhage during operation, which ought to be preventible, or air embolism, which must be exceedingly rare. Serious and even fatal hæmorrhage, however, during the reaction from operative shock is not unknown. In such cases the violent effort of vomiting displaces the gauze plug placed in the sinus.

More serious and more common, if less obvious at the time, is the aspiration into the lungs and general circulation of tubercular, pyogenic and putrefactive debris from antrum, attic and carionecrotic bone. This may occur at the time of the operation when the sinus is wounded, or may continue during the after course of the case, in either event with serious or even fatal result.

Wounding of a freely exposed sinus may occur during the

re-insertion of the packing into the mastoidectomy cavity at one of the subsequent dressings of the case, and this is specially apt to occur in the case of a violently struggling child. The advantages of preliminary ligature are as marked here as during the operation.

OBSERVATIONS ON THE USE OF EUCAINE B. AND ADRENALIN AS A MEANS OF INDUCING LOCAL ANÆSTHESIA

By GEORGE L. CHIENE, F.R.C.S.,
Assistant Surgeon, Royal Infirmary, Edinburgh

LENNANDER (1), in a paper entitled "Observations on the Sensibility of the Abdominal Cavity," makes the following statement: "Surgical procedure and antiseptics have attained to such a stage of safety that in many cases the narcosis may be regarded as relatively the most dangerous factor in an operation. The efforts, therefore, now being made to replace general anæsthesia by local are not only justified, but belong to the most important questions in surgery." If such be the case, no further excuse is necessary for the observations which I have arranged under the following headings:—

(1) A short account of those cases in which I injected subcutaneously a solution of adrenalin chloride and eucaine B., and what led me to adopt this method.

(2) A synopsis of some of the more important literature bearing on the subject.

(3) The results of an improved and simple method which I have recently used.

In January 1903, when I was operating on a case in which local anæsthesia was used, some troublesome oozing occurred and was immediately controlled by the application of renaglandin. It struck me that cocaine or eucaine B. might with advantage be combined with some preparation of adrenalin, and I resolved to try it on the first suitable case. A short time afterwards I was asked to see a case of empyœma; the patient was a male, 16 years of age, whose chest had twice previously been tapped and pus drawn off. When examined

by me the apex beat of the heart was 1 inch below the mamma and 1 inch internal to the mid-clavicular line on the RIGHT side. The physical signs showed the left pleural cavity to be full of fluid. Resection of a portion of rib was recommended, but the case was considered a very unsuitable one for chloroform. The following mixture was used as a local anæsthetic:—

4 parts of 2½ per cent. eucaine B.
1 part of 1-1000 of adrenalin chloride.

The resulting mixture therefore being a 2 per cent. solution of eucaine B. and 1-5000 of adrenalin chloride. Thirty minims of the above solution were injected into the subcutaneous tissue in the line of the long axis of the rib. Twelve minutes were allowed to elapse and then the usual operation performed; this was accomplished without pain or discomfort to the patient, more of the solution was, however, applied to the periosteum before the portion of the rib was excised. The patient made a good recovery. The points noted were, that the tissues in the region of the injection became blanched, that there was practically no bleeding, that the bone was cut through without the patient complaining of any pain, and that there was no after-hæmorrhage. The results in this case were so satisfactory that I used the same mixture in various other minor operations. The solution was also used by others at my suggestion with the same good results. In one case the results were not satisfactory, but the adrenalin chloride used was taken from a bottle which had been opened some time and had probably lost its efficiency.

I now pass to the second heading, that dealing with some of the more important literature bearing on the subject. On July 11th, 1903, Professor Barker (2) gave a lecture entitled "Clinical Remarks on some Improvements in the Method of Local Analgesia," and in it drew attention to the work on the subject by Dr Braun (3, 4), of Leipzig, whose paper he had read, and in consequence of which he had adopted the method in his own practice. I regret that it was only on the publication of this paper that I became aware of Braun's work. In the *Centralblatt für Chirurgie*, April 4th, 1903 (No. 14), there is a synopsis of his original paper on the subject. This original paper was published in *Langenbeck's Archives*, vol. lxix.,

and in it a very exhaustive account of his own work is given. In introducing the subject he states that the theory of Prior regarding the action of anæsthetics and narcotics can be applied to local as well as to general anæsthesia, and refers to the fact already known that the local effect of an anæsthetic is greatly increased in tissues whose vitality has been lowered by the temporary cutting off of their blood supply. This can be done by the application of a tourniquet or by means of intense cooling of the tissues. The same effect can be obtained by the addition of adrenalin chloride to cocaine or eucaine B. Tropacocaine combined with adrenalin has not the same action. He also points out that a large quantity of cocaine can be introduced into tissues whose vitality has been lowered by one of the above-mentioned ways, without risk of general poisoning from absorption, and that the local effect is proportionately increased. His observations were not confined to infiltration of the tissues in the region of the operation, but extended to observations on cases in which the solution was injected in the region of larger nerve trunks. In the *Centralblatt* of 19th Sept. 1903 (No. 38), Braun (5) gives a further account of his work, and draws attention to two points:— First, the quantity of the substance injected. Second, the after-hæmorrhage which can originate from its application. He considers that with such an active drug as adrenalin, great caution should be observed as to the quantity injected, and mentions a case in which nausea and vomiting occurred after the injection of 20 c.cm. of ½ per cent. eucaine B. solution with 10 minims of commercial adrenalin chloride (1-1000). In a few of his cases in which a similar dose was used, transitory cardiac palpitation occurred. He maintains that the unfortunate complications described by others would not occur if the solution were prepared, and the amount injected, as he advises. The stock solution in which he preserves the adrenalin is made up as follows:—

Acid. Hydroclor. Pur. . .	0.2 parts.
Sod. Chlor.	0.8 „
Aq. Destill. . . .	100.0 „

To 10 c.cm. of this mixture, which has been heated to boiling point in a test-tube, he adds 1 c.g. of pure adrenalin and again boils it. The solution, to which some carbolic acid is

added, is then stored in small brown flasks holding from 3 to 5 c.c., which are carefully sealed. He maintains that if the adrenalin is prepared in this manner it will last for ever. He then passes to the second question, that of after-hæmorrhage, and in so doing draws attention to the fact that exceedingly small quantities of adrenalin have the desired effect. If adrenalin be used too strong, it is probable that the larger vessels, as well as the capillaries, will for the time being be constricted, and may, at a later period, give rise to hæmorrhage, therefore it is advisable to use a solution of adrenalin which will only act on the smaller arteries and capillaries. Bleeding then occurs from the larger arteries at the time of the operation, and allows of a ligature being applied. When using the infiltration method of Schleich, the following solution is employed :—1 per cent. of eucaine B. or cocaine to 100 c.cm. of which are added two to five, but not more than five, drops of 1-1000 adrenalin chloride. This mixture contains about .00007 to .00017 per cent. By this means the capillaries and smaller vessels only are acted upon, but the medium-sized vessels bleed and are treated in the usual way. For injection in the region of nerve trunks he used a 1 per cent. solution of eucaine B., to 1 c.c. of which has been added 2 ♏ of the adrenalin solution; in other words, for this purpose he uses the adrenalin a hundred times stronger than in the infiltration method. He further states that seldom has he injected more than 5 ♏ of 1-1000 adrenalin chloride into any individual patient. Barker (2), having tested Braun's statement, found that the results were far superior to those produced by eucaine B. alone. He suggests the following as the most convenient way of making the preparation. "Powders of B. eucaine and pure chloride of sodium, sufficient to make 100 cubic centimetres (3½ ounces) of the solution, are kept in thick glazed paper ready for use. The amounts in each of them are—B. eucaine 0.2 gramme (3 grains), and pure chloride of sodium 0.8 gramme (12 grains). One hundred cubic centimetres of boiling distilled water are measured off, and to this the contents of one of the papers are added, and then one cubic centimetre of Messrs Parke, Davis & Co.'s solution of adrenalin chloride when the fluid is cool. As the adrenalin preparation is of the strength of 1 in 1000, we now have 100 cubic centi-

metres of normal saline solution, with 2 in 1000 B. eucaine and 1 in 100.000 of adrenalin chloride in it—*i.e.* distilled water, 100 grammes; pure chloride of sodium, 0.8 gramme; B. eucaine, 0.2 gramme; and adrenalin chloride 0.001 gramme."

He mentions that the amount of adrenalin chloride required is about 15 to 18 drops to the c.c., and suggests that each bottle when first used should be tested with a standard c.c. measure. He then goes on to describe his cases, and mentions in detail the *modus operandi* to be employed in a case of inguinal hernia. Towards the close of his paper he mentions some of the practical difficulties met with while using the adrenalin solution, but states that his experience with eucaine B. and chloride of sodium in the solid form has not encouraged him to hope "that, with the addition of adrenalin, a practicable, serviceable solid can be made, which can be used with the simple addition of 1000 c.c. of boiling water. But perhaps the ingredients, as indicated above, may be furnished to us in glass capsules as suggested." While on the subject of the preparation to be employed, I would mention that Bates(6), in the *New York Medical Record* of February 1901, states that tablets of adrenalin chloride are less efficient because the excipient interferes with its action; and at a later date, in the same journal, states that "tablets are useless."

I cannot agree with the above statements, and further, the makers of the various preparations in the market draw attention to the possibilities of the drug becoming inert owing to the ready way in which adrenalin becomes oxidised. Prof. Barker in his lecture draws particular attention to this point. Honigmann (7), in the *Centralblatt* of July 20th, 1903, No. 25, gives his experience of the mixture which he tried on reading Braun's paper. He makes the solution directly before use, and sterilises it by boiling. He has had no bad results, but has never injected more than 1 m.g. of adrenalin. Foisy, who has used the mixture in inflammatory conditions, considers it essential to have the patient lying on his back both at, and for some time after, the operation; Honigmann has found this precaution unnecessary.

Donitz (8), in an interesting article, gives the results of experiments performed on animals in which he injected a

mixture of adrenalin chloride and cocaine into the subdural space, and maintains that in animals this method allows of the most severe operations being performed. He prefers to reserve his information regarding the actions produced in man, but is satisfied that adrenalin and cocaine combined are safer than cocaine alone. Regarding the various actions of adrenalin on animals, much valuable work has been done, and in man complications have been described, not only in cases in which the drug has been injected subcutaneously, but also in those in which it has been sprayed on mucous surfaces.

Professor Schäfer (9) has made many observations on its action on animals, and gives a very full account of the increase of the blood-pressure following its use.

Blum (10), Noël Paton (11), Herter (12), and others, have performed numerous experiments on animals, showing that glycosuria follows the administration of adrenalin chloride.

Hartwig (13) has reported serious complications in man, and Enderlin reported a case which terminated fatally owing to paralysis of respiration, as well as other cases in which undesirable symptoms occurred. In only one case have I seen any bad results, and that was in a boy who suffered from severe nausea and vomiting for about two hours after the injection. Braun, whose clinical experience is probably greater than that of any other writer, maintains that if the solution is good and used in the quantities which he suggests no unpleasant symptoms will occur.

I now pass to the third and last point, namely, the question of an improved and simple method of employing adrenalin. From what has been said regarding the difficulties of preparing and keeping adrenalin solutions, and further, the possibility, not only of failures, but of danger in injecting the substance after it has become inert or contaminated, it will be evident that it is impracticable for the general practitioner to use this means of local anæsthesia with any degree of safety or comfort, and yet I am convinced that it has a great future before it, could a certain rapid means of obtaining the solution ready for injection be employed.

Recently Messrs Burroughs, Wellcome & Co. have brought out a new preparation of the supra-renal gland called "Soloid Hemisine." They maintain that it represents the hæmostatic

principle of the supra-renal gland in a stable, solid and convenient form ; also that it is of constant composition.

I thought it worth while investigating this preparation with a view to combining it with eucaine B., and have found it up to the standard which the makers claim for it. At my request Messrs Burroughs, Wellcome & Co. have made up Soloids of various strengths, and recently I have been using Soloids[1] which, when dissolved in 10 c.c., give a solution of 1 per cent. eucaine B., and 5 ♏ of adrenalin (1-1000); this has proved very satisfactory, and the full quantity of adrenalin can be injected with safety. These Soloids have been used in a large number of minor surgical operations. In one case a carbuncle, the size of the palm of the hand, was excised without pain or discomfort to the patient, and at a later date the surface was skin-grafted, the same local anæsthetic being used. In cases of this nature general anæsthesia is strongly contra-indicated. There are, however, disadvantages in having the eucaine and adrenalin combined, and recently Messrs Burroughs & Wellcome have made up Soloid Hemisine tablets for me equal to 5 ♏ of adrenalin solution (1-1000). In this form the Hemisine can be employed with any strength of eucaine or cocaine that may be found desirable for individual cases. With regard to the actual injection, Barker describes a syringe which is probably the best ; it can be boiled without the addition of an alkali to the water, which, if present, would make the adrenalin inert. I have used a syringe capable of holding 10 c.c., to which a special needle, bent to an angle of 45 degrees, has been fitted. I have found this needle of great practical use. For the general practitioner, who only occasionally requires to use a local anæsthetic, I am satisfied that Soloid Hemisine is a most convenient and safe method of using adrenalin. Regarding the greater safety and efficiency of cocaine or eucaine as a local anæsthetic, when combined with some preparation of adrenalin, there can be no doubt.

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[1] These Soloids can be obtained from Messrs Baildon & Son.

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Note.—Since the substance of this paper was read last November before a junior medical society in Edinburgh, further observations on spinal anæsthesia have been published, and other preparations of adrenalin have been introduced.

Clinical Records

TWO CASES OF OVARIAN CYST, COMPLICATED BY HERNIA

By J. M. COTTERILL, F.R.C.S.,
Surgeon to the Royal Infirmary, Edinburgh

I HAVE recently had under my care in the Royal Infirmary two cases sent in as herniæ—one umbilical, the other femoral—where the herniæ have been in reality secondary to cystic tumours in the pelvis.

CASE I. R. R., aged 40, sent in by Dr Nicholson of Kirkcaldy.

The patient had noticed a swelling for a little over a month, situated in the upper part of Scarpa's triangle, and about the size of a walnut. The swelling gave no pain, and disappeared to some extent on the patient lying down. She was recom-

mended to apply at the Royal Infirmary, to have the radical cure for femoral hernia carried out.

On examination, it was found that the greater part of the swelling was due to the presence of fluid, which could be easily pushed into the abdomen, a certain amount of fatty tissue remaining irreducible.

The patient having been anæsthetised with narcotile and subsequently chloroform (a combination which is generally used in my wards), I exposed the sac, and found a lipoma which had originated in the extraperitoneal fat, lying outside of a thin translucent sac. On opening the latter, several ounces of a dark, blood-stained fluid escaped. Pushing my finger up through the neck of the "sac," I found it pass into a cavity about the size of a large orange, lying in the right half of the pelvis. I accordingly made a second incision above Poupart's ligament, and removed a parovarian cyst from the right broad ligament. This cyst had curiously enough projected itself in part through the right femoral canal, causing a very unusual variety of femoral hernia. Descent of an ovary into a hernial sac is not very uncommon; I happened to meet with one in an inguinal hernia a few days after the above-described operation; and upon two other occasions I have had a similar experience, but the herniation of part of an ovarian tumour is, I believe, very unusual.

CASE II. Mrs M., aged 58, sent from Burntisland on account of an umbilical hernia.

This hernia had been present for seven months. It projected just to the left side of the umbilicus, and was about the size of a small cocoa-nut. It contained fluid, all of which could be slowly reduced into the abdominal cavity through what was evidently a very small opening. The hernia was dull throughout on percussion, and it was noticed that this dulness passed down from the hernia towards the left side of the pelvis, which was occupied by a large swelling about the size of a man's head.

Through a central incision I removed a large multilocular cyst of the left ovary. The umbilical hernial swelling was not in this case a protrusion of part of the cyst, but it was evident that adhesions had formed between the anterior surface of the tumour and the parietal peritoneum around the umbilicus. Amongst these adhesions fluid had formed, and had eventually found its way out through the weakest part of the abdominal wall at the umbilicus, forming an unusual variety of umbilical hernia. This secondary sac was found to contain about twenty-five ounces of clear fluid, about half of which fluid lay usually inside and half outside the abdominal wall, the two cavities

being connected by a small opening, which would perhaps admit a No. 6 catheter. The ovarian cyst proper contained the usual viscid yellow or brown fluid, and was composed of some five or six loculi.

Both these patients have made excellent recoveries, and have now left hospital.

Editorial Notes and News

The British Medical at Oxford.

THOSE of us who were concerned with the organisation of the Edinburgh Meeting of the Association have since then cherished the belief that the '98 Meeting was the most successful in the history of the Association. But those who were at the Oxford Meeting confess that there was a something there which places the 1904 Meeting in the first place. It was not the organisation: the Edinburgh Meeting was at least as well organised; it was not that the Sections were any better; it was not the Pathological Museum, excellent though that was; it was Oxford and its academic atmosphere. The Colleges and their crumbling walls, their lovely gardens, the turf rolled and cut for centuries, the historical associations: these were what has warmed all our hearts to Oxford.

And Oxford put its best foot foremost. The Colleges opened their doors and many, previously ignorant, have now some idea of what University life is like, and can appreciate the multifarious talents of the *Scout*. The Vice-Chancellor, grandson of our own Munro Tertius, spared no exertion to welcome the Association, and set a high standard to the heads of those numerous Universities which, it is understood, contemplate at no distant date being the hosts of the Association.

Dr Collier, the President, was never idle, and did everything in his power to find accommodation for the amazing number of guests who attended the Meeting. Last year, in referring to his election, we expressed the belief that the address of a young president, and surely Dr Collier is the youngest the Association has ever had, might look forward to the future. But Dr Collier followed the usual custom, and in his address gave an interesting account of the rise of the Oxford Medical School. This cannot be said to have been rapid, for there has been a school of sorts for centuries. But its modern development has been accelerated, and though we can hardly agree with Dr Collier that the change from the Bob Sawyer type of medical

student is entirely due to Oxford, there is no doubt that it has had an influence all its own.

The enormous number of Members, and the swarms of ladies who accompanied them, formed a severe strain on the entertainment part of the Meeting. But the Thames and the College gardens were always there, and at the ladies' reception, the beautifully illuminated gardens of New College seemed capable of accommodating an indefinite number. The garden party at Mrs Morrell's gave visitors the opportunity of seeing the best type of an English garden. But the Editors of this Journal were otherwise engaged that afternoon. The golf match ended, as it has for some years now, in a victory for the English, and we suggest to the Scottish divisions that they should, in the selection of their representatives for next year's Meeting, keep the match in view. We cannot conscientiously praise the course, but we readily admit the correctness of the anticipatory announcement "that it would test the players' skill to the utmost."

The Representative Meeting.

THE Agenda formed a volume which it was almost an effort to carry around, and it did not seem likely that a week would be time enough for its consideration.

However, the meeting, by acclamation, voted Sir Victor Horsley to the chair, and under his genial and tactful management the whole was got through in a couple of afternoons. It is to be hoped that Sir Victor will consent to be re- and re-elected, for it would be impossible to find a better chairman.

The most important thing the meeting did was to approve of the principle of the registration of nurses, by a majority which surprised even those most in favour of the proposal. With the principle that nurses who have been properly trained for a period of three years in a modern hospital should be somehow recognised we entirely agree, but we do trust that the whole good of the proposal will not be vitiated by putting on a "register" practically every woman who calls herself a sick nurse, as was done under the Midwives' Bill.

The question of conference between medical witnesses was very properly referred back for further consideration. On the face it seems desirable, but the more it is considered the larger loom the difficulties, and another year may well be occupied over it. We hope to deal with the proposal at length in an early number.

The representatives wisely decided to take no action on the proposal that steps should be taken to have the Association directly represented on the General Medical Council.

The Regius Chair of Medicine in Oxford.

THE success of the meeting will no doubt prove a useful advertisement for the Oxford Medical School. But those who finally succeeded in persuading the authorities to submit to the King the name of William Osler for the Chair of Medicine have done a service not only to Oxford, but to the whole country. Prof. Osler is probably the best known living physician; but when there is added to that qualification width of general culture (too uncommon nowadays), geniality, and charm of speech, Oxford is indeed to be congratulated on its good fortune. Osler's speech in seconding the vote of thanks to the President for his address quite carried away the assemblage, and if there were any hesitating selectors present at the commencement there would be none when the meeting closed.

New Professors of Pathology.

PROF. LORRAINE SMITH of Belfast has been appointed to the Chair of Pathology in Manchester. Prof. Delepine has resolved to devote himself to Bacteriology, and will teach that subject in future. There has been a good deal said about this being the first school to adopt this wise division. Perhaps the observation is literally correct. The fact is that in most Continental schools Bacteriology is associated with the Chair of Public Health, and everyone knows that a large part of the time of many professors of Pathology in this country is now occupied with public health work. There is no doubt that we want some rearrangement of the work of our Chairs, for there is hardly one which does not somewhere overlap one or more of the others.

There is another point of interest in Prof. Lorraine Smith's election. It is pretty common knowledge that the election has been going on for some months, and that finally the Chair was *offered* to its new occupant, who was not among the applicants. No doubt there is something to be said for both methods of procedure, but we must say that our sympathies are in favour of this newer method and against the endless wire-pulling and canvassing associated with the older. The question does not wholly, though it does largely, depend on the competency of the selectors, for the simple reason that just as often in ecclesiastical appointments in this country those most competent for an appointment will not submit themselves to the indignities of canvassing, and the curators are, we suppose, as a rule restricted to applicants.

Dr Grünbaum of Liverpool has been appointed to the new Chair of Pathology in Leeds. Here, too, a new method was adopted. The vacancy was not even advertised. The selectors

had before them certain names, considered these, and then announced their decision.

Post-Graduation Study in Edinburgh

CAN nothing more be done to promote post-graduate study in Edinburgh? Every year a considerable number of medical practitioners, many of them old Edinburgh students, come to Edinburgh with the object of gaining knowledge of the newer methods of physical diagnosis, and of widening their experience in one or more branches of their profession. Among such men it is a matter of common complaint that very little seems to be done to meet their special requirements, and some even leave Edinburgh to pursue their studies elsewhere. In some other medical centres it has been recognised much more clearly than among ourselves that the graduate of some years' standing represents a class of student well worth catering for. That this is the case may be indicated in a rough way by the fact that in the educational number of the *British Medical Journal* we find the description of the facilities for post-graduation study in London occupies four columns and a half, while Edinburgh is dismissed in a small fraction of a column. At the West London Post-Graduate College the yearly entry is now over 150, while the London Medical Graduates' College and Polyclinic is also proving very successful.

That the development of post-graduate study in Edinburgh would greatly strengthen the school as a whole goes without saying. And in many ways Edinburgh is well fitted for such development. For one thing, everything is very compact. The University, extra-mural class-rooms, the Infirmary and other hospitals are all within very easy reach of one another. For another thing, there are plenty of able young teachers whose time is not, we fear, so fully occupied with private consulting work that they would be unable to spare a few hours during the summer for further teaching. Material for teaching and demonstration is also abundant.

What seems wanting is a recognition, firstly, of the value of post-graduate teaching, and, secondly, of the special needs of the graduate. The common complaint of the graduate at present is precisely the opposite of that of the undergraduate. The latter complains that his time is much too fully occupied, and that, with classes in the morning, Infirmary in the forenoon, classes in the afternoon, and tutorials at night, he has little or no time left for reading. The graduate, on the other hand, complains that everything he wants to see seems to take

place at once. Eyes, ears, throats, skins, surgical operations, medical electricity and all the rest must be attended between 11 and 1. During the rest of the day there is nothing to do. So men say; and if the saying is a little exaggerated, who can deny that it contains a good deal of truth?

What, then, should be done? Probably the first step should be to ascertain, from the experience of other schools, the time of year at which the greatest number of students attend. That done, a programme might be arranged for a series of practical demonstrations, clinical lectures and meetings for practice in the various subjects which are likely to attract graduates of a few years' standing. These should be so arranged as to make it possible for a student to attend four or five classes daily if he desired to do so. The classes should all be as practical as possible, and should not extend over too long a period. When the programme is once arranged it should be well advertised well in advance of the time when the meetings are to commence. What we suggest, in short, is a kind of summer school (if summer prove the acceptable time) similar to that which Professor Geddes has for many years successfully carried on for teachers and others at the Outlook Tower. To work out such a scheme in detail and in practice will involve a great deal of trouble and some, but not necessarily much, expense, but would it not be worth while?—(*Communicated.*)

Post-Graduate Teaching in Paris

WE are asked to publish the following announcement:—

ASSOCIATION OF MEDICAL PROFESSIONAL TEACHING.

HOLYDAYS COURSES.

Holydays 1904.

From Monday 19th of September to Saturday 1st of October, courses and practical demonstrations, the roll of which follows, will take place at the "Hôtel des Sociétés savantes (Science Societies House) rue Serpente (Serpente street) and in several hospital services, at Paris.

1° At the Science Societies House (Hôtel des sociétés savantes, rue Serpente)

Bacteriology	Dr. Veillon
Dermatological and syphiligraphical therapeutics	Dr. Leredde
Massage	Dr. Marchais

Diseases of urinary organs	Dr. Noguès
Electrotherapy	Dr. Zimmern
Midwifery	Dr. Dubrisay
Nervous diseases	Dr. Sollier
Applied therapeutics	Dr. Landowski
Hygiene and therapeutics of children	Dr. Lesné

2° In various hospital services

Gynoecology	Dr. Arrou (St. Antoine Hospital)
Practical surgery	Dr. Souligoux (Lariboisière)
Auscultation	Dr. Caussade (Tenon)
Stomacal diseases	Dr. Soupault (Bichat)
Oto-rhino-laryngology	Dr. Laurens (Bichat)
Ophtalmology	Dr. Morax (Lariboisière)

The inscription tax for every course (which will include about from 8 to 10 lessons) is settled to 20 francs, to be paid when having one's name put down.

Correspondence inscription allowed.

Detailed programmes will be sent.

For inscription and all informations, apply to Dr. Marchais, Hôtel des Sociétés savantes, rue Serpente, Paris.

Salaried Positions open to Medical Men in the Larger Cities.

UNDER the above title Dr Higley publishes an interesting paper in the *Medical Record* for May 28th. The work of the health department is the first to come under review, and the health department of New York city is chosen as the largest and in many respects the most completely organised in the country. In this department there are constantly employed upon salary upwards of 240 physicians. In addition numerous temporary appointments are made as occasion may require. The chief positions are: a general medical officer at a salary of $5000; a sanitary superintendent, $5000; five assistant sanitary superintendents at $3500; two chief inspectors of contagious diseases, $3000 and $2500; fourteen diagnosticians, $1200 to $1800; fifty-two sanitary inspectors, one half of whom may be physicians, $750 to $1800; one registrar of records, $4000; four assistant registrars of records, $3000; one assistant director of the bacteriological laboratory, $2110; twelve assistant bacteriologists, $1200. The mode of election to these appointments is interesting. With one or two exceptions they come within the civil service law, and competitive examinations

are held for them by the Municipal Service Commission. Those who obtain 75 per cent. or more in the technical paper are placed upon the list from which appointments are made, the applicants with the highest percentage heading the list and so on. When appointments are to be made the three names highest on the list are submitted to the appointing power, and any of these three persons may receive the appointment. The names of the two unsuccessful candidates are replaced in the list in their old positions. If a name is submitted three times without the candidate being appointed, it is then removed from the list altogether.

The duties involved in the various offices are described. The post of diagnostician must be rather a difficult one to fill. Each diagnostician has a district assigned to him, and is sent to every case reported therein for removal to the contagious disease hospital. They also discharge the patients from the department hospital at the expiration of the sickness. The registrar of records and his assistants are responsible for the vital statistics of the department, and the reception and granting of death certificates, burial permits, etc. The vaccination inspector is given a district which he canvasses daily with a view to obtaining vaccinations. Of these he is supposed to return at least 100 per week. The medical inspection of schools is carried out by inspectors, to each of whom a certain number of schools are assigned. These are visited daily, and the pupils examined for evidences of contagious diseases, including various affections of the eyes and skin. Nothing is said as to the supervision of the milk supply, or the management of municipal milk laboratories.

The police and fire departments offer a number of appointments at salaries of $2000 and $3000. These may be held for life, and the holder is free to engage in private practice. The duties comprise attendance upon members of the uniformed force. For attendance upon their families any reasonable fee may be charged. These appointments are regarded as much more desirable than the municipal ones. The list of physicians available for appointment is therefore always a long one, although each list lasts only two years, a fresh examination being held at the end of that period.

The street cleaning department, the department of public charities, the tenement house commission, the quarantine and immigration services all offer appointments to medical men at various salaries.

Besides these public appointments there are numerous positions offered by street railway corporations, manufacturing concerns and medical publishing houses. Some of the large "department stores" even carry their enterprise so far as to

keep a doctor always on the premises to attend to any of their patrons who may take ill while making their purchases!

Club practice also seems to flourish in New York as it does with us, and to be as poorly paid, the over-crowding of the profession being so great that such associations are more or less constantly besieged by applicants for the positions they offer.

Obituary

Sir William Mitchell Banks, M.D., LL.D., F.R.C.S. England, J.P., etc.

To many of us in Edinburgh the news of Banks' death, so startlingly sudden, came with a sense of surprise as well as personal bereavement. Only the other day he was here in full strength and abundant brightness of spirit, joining in all that was going on. He presided in the most genial manner at the dinner of the Royal Infirmary Club. He was an honoured guest at other more private and select symposia. He showed all his eager interest in everything social, civic, and professional. He was the typical specimen of an honoured, successful, fortunate man, enjoying the return to his own loved city.

He had done his work manfully in every previous stage of his career—prosector with Goodsir, graduate with honours, gold medallist for a singularly original and erudite dissertation, demonstrator of anatomy with Allen Thomson—truly a distinguished undergraduate and postgraduate course. Then, like many a perfervid Scotsman, he went abroad, to Paraguay, where he fought as well as healed.

When Bickersteth of Liverpool needed an assistant, Banks went to him recommended by Professor Syme, after which Liverpool was his home. His life-work there was in the Liverpool School of Medicine, which was in a condition of suspended animation, and under his care, with a band of able coadjutors, including Drs Alexander Davidson, Caton, Waters and Mr Reginald Harrison, the School gradually gained strength and activity. Banks did the work in anatomy, postponing his own surgical instincts for the good of the School. In 1875 he became assistant surgeon to the Royal Infirmary, getting wards in 1877. For twenty-five years he was a brilliant worker and teacher in the wards. His name is associated with marked advances in the treatment of hernia and in operations on the breast. His genial manner, abundant humanity in the best sense of the word,

love of his fellow creatures, made him an immense favourite with the hard-headed and shrewd workman of Liverpool. He was an admirable organiser, and did much in every line of professional progress, especially in the gradual advance of the Liverpool School, in which he was Dean, first to a college and then to a part of a university. He helped in no small measure in the building of the new infirmary, and when he had to retire at sixty, was appointed consulting surgeon with ten beds under his care.

He served on the medical board of the Infirmary, was a representative of Victoria University on the general medical council, and had a seat in the council of the Royal College of Surgeons of England. Truly a strenuous hard worked life with many interests and many cares. Banks was able to carry all this work lightly, had many other interests, read, travelled, used hospitality, was a cheery friend and an admirable raconteur. The many honours he had received from his sovereign, his fellow-citizens, his alma mater, pleased him but did not spoil him. He put on no side, and did not seem greatly changed from the bright wholesome Edinburgh laddie that some of us knew nearly half a century ago.

Banks will live long in the memories of his friends and pupils, and when the history of the new birth of the Liverpool School of Medicine and its splendid new infirmary comes to be written, no name will appear oftener or deserve more gratitude than that of William Mitchell Banks. J. B.

Monthly Return of the Births and Deaths Registered in Eight of the Principal Towns of Scotland, July 1904.

DURING the month of July 1904, there were registered in the towns of Glasgow, Edinburgh, Dundee, Aberdeen, Paisley, Leith, Greenock and Perth, the births of 4124 living children, of whom 2091 were males and 2033 females. These births are equivalent to an annual birth-rate of 28.1 per thousand of the estimated population. The birth-rate was highest during the month in Aberdeen, where it was 29.8, and lowest in Edinburgh, where it was 24.3. In Paisley it was 29.7; in Glasgow, 29.5; in Leith, 29.1; in Dundee, 27.7; in Greenock, 26.0; and in Perth, 25.7. The births are 328 fewer than in June and 294 fewer than in July 1903.

Of the total births, 3837 were legitimate, and 287, or 7.0 per cent., illegitimate. This illegitimate rate was highest in Perth, 9.5, and lowest in Paisley, 4.2; in Aberdeen it was 8.9; in

Dundee, 7.3; in Glasgow, 6.9; in Edinburgh, 6.7; in Greenock, 6.5; and in Leith, 6.0.

Deaths registered in these towns during the month numbered 2127, the equivalent annual death-rate per thousand of the estimated population being 14.5. This rate is 2.1 less than in June and 1.1 less than in July 1903. The actual number of deaths is 232 fewer than in June and 135 fewer than in July 1903.

The death-rate was highest in Paisley, 17.5; and the lowest in Perth, 10.8. In Dundee it was 16.4; in Glasgow, 15.1; in Greenock, 13.9; in Edinburgh, 13.7; in Aberdeen, 12.6; and in Leith, 11.4. These rates, with the exception of that for Paisley, are all less than the corresponding rates for June.

Of the 2127 deaths, 744, or 35.0 per cent., were of children of less than five years of age, and 480, or 22.6 per cent., of persons of over 60. Compared to the corresponding deaths in June, those of children are 53 fewer, and those of persons of over 60 are 46 fewer.

The deaths of children of less than one year old numbered 436 The equivalent infantile mortality per thousand births is 101. This rate is 9 less than in June; it was highest in Aberdeen, 111, and lowest in Perth, 14. In Paisley it was 110; in Glasgow, 107; in Dundee, 99; in Edinburgh, 96; in Greenock, 92; and in Leith, 74.

The seven principal epidemic diseases accounted for 213 deaths, which is equal to an annual mortality of 1.5 per thousand of the estimated population of these towns. These deaths are 43 fewer than in June, and 15 fewer than in July 1903. The rate was highest in Glasgow, 1.7; and lowest in Perth, 0.7. In Paisley it was 1.5; in Dundee, 1.4; in Edinburgh, 1.3; and in Aberdeen, Leith, and Greenock, 1.0.

There were 6 deaths from small-pox This is 3 fewer than in June, 4 fewer than in May, and 12 fewer than in April. Of these 6 cases 5 were in Glasgow and 1 in Edinburgh; of them 2 were of persons who had been vaccinated, 2 of persons who had not been vaccinated, and 2 of persons whose vaccination was doubtful.

Deaths from whooping-cough numbered 92, from measles 32, from typhoid 16, from typhus 1, from scarlet fever 11, from diphtheria 10, and from diarrhœas 45. Compared to the returns of June, deaths from whooping-cough are 13 fewer, from measles 31 fewer, from typhoid 4 more, from scarlet fever 2 more, from diphtheria 9 fewer, and from diarrhœas 6 more. There were no deaths from typhus during June.

Deaths from influenza numbered 6. This is 1 fewer than in June, but 3 more than in July 1903.

Deaths from puerperal septic conditions numbered 3; from

malignant growths 124; from apoplexy 117; from heart disease 196; and from premature birth debility 63.

Deaths from pneumonia numbered 161, and constituted 7.6 per cent. of the total deaths; from bronchitis 99, being 4.7 per cent. of the total deaths; and from phthisis 194, being 9.1 per cent. of the total deaths. Deaths from phthisis were 30 fewer than in June, from bronchitis 48 fewer, and from pneumonia 48 fewer.

There were 89 deaths registered as due to violent causes; of them 7 were suicides, 3 being by cut-throat, 1 by precipitation, and 3 by drowning.

Deaths are recorded of three persons of over 90 years of age, the oldest of whom was a farmer aged 94.

Lists of Passes

UNIVERSITY OF EDINBURGH

THE summer graduation ceremonial of the University of Edinburgh took place on Saturday, July 23rd, in the M'Ewan Hall, the Vice-Chancellor, Principal Sir William Turner, presiding. The honorary degree of LL.D. was conferred on Samuel Henry Butcher, D.Litt., LL.D., etc., lately Professor of Greek in the University of Edinburgh; on the Hon. Sir Walter Francis Hely-Hutchinson, G.C.M.G., Governor and Commander-in-Chief, Cape of Good Hope; on the Right Hon. John Morley M.P., P.C., O.M., F.R.S., LL.D., D.C.L.; on Sir George Reid, D.L., lately President of the Royal Scottish Academy; and on Professor William Thomson, M.A., B.Sc., Registrar of the University of the Cape of Good Hope.

The following gentlemen were presented to the Vice-Chancellor by the Dean of the Faculty of Medicine, and had the degree of Doctor of Medicine conferred on them:

R. E. Adamson, M.B., C.M. (*in absentiâ*); *R. T. G. Aickin, M.B., Ch.B.; H. Bairy, M.B., Ch.B.; C. S. Brebner, M.B., Ch.B.; G. A. Brogden, M.B., Ch.B.; J. M. L. Brown, M.A., M.B., Ch.B. (*in absentiâ*); *J. Brownless, M.B., Ch.B.; ‡T. L. Bunting, M.B., C.M.; ‡J. Cameron, D.Sc., M.B., Ch.B. (with Second Class Honours); *H. G. Carlisle, M.B., Ch.B.; G. S. Carmichael, M.B., Ch.B. (with First Class Honours); *J. C. Carr, M.B., Ch.B.; *A. F. R. Conder, M.B., Ch.B.; *R. W. Cunningham, M.B., C.M.; *C. B. Dobell, M.B., C.M.; C. W. Donald, M.B., C.M.; A. Douglas, M.A., M.B., C.M. (with Second Class Honours); W. Eadie, M.B., Ch.B.; S. C. Ellison, M.B., Ch.B.;

* Commended for their Theses. † Highly commended for their Theses.
‡ Awarded gold medals for their Theses.

D. Findlay, M.B., C.M.; A. D. Fordyce, M.B., Ch.B.; C. Fraser, M.A., M.B., Ch.B.; J. D. Gilruth, M.A., M.B., C.M.; R. A. Glegg, M.B., Ch.B.; D. D. Gold, M.B., C.M.; St L. H. Gribben, M.B., Ch.B.; R. A. J. Harper, M.B., Ch.B.; †J. P. Hay, M.B., Ch.B; T. F. Johnston, M.B., C.M.; *R. King, M.B., Ch.B.; *E. S. Lewer, M.B., C.M.; G. R. Livingston, M.B., C.M.; R. M. Lyon, M.B., C.M.; P. N. M. Macdonald, M.B., Ch.B.; J. L. Marjoribanks, M.B., C.M.; J. K. Matheson, M.B., Ch.B.; *K. D. Melville, M.B., Ch.B.; †T. L. Morgan, M.B., C.M.; D. N. W. Murray, M.B., Ch.B.; E. F. M. Neave, M.B., Ch.B.; T. M. Ness, M.A., M.B., C.M.; *C. H. Nixon, M.B., Ch.B.; ‡W. H. Prentice, M.A., M.B., Ch.B. (with Second Class Honours); R. M. Rowe, M.A., M.B., Ch.B. (with Second Class Honours); *C. W. Saleeby, M.B., Ch.B. (with First Class Honours); †R. Seheult, M.B., C.M. (*in absentiâ*); J. F. Selkirk, M.B., Ch.B.; *H. M. Speirs, M.B., Ch.B.; *E. G. B. Starkie, M.B., C.M.; I. S. Stewart, M.B., Ch.B.; E. C. Thomas, M.B., C.M.; N. N. Wade, M.B., Ch.B.; *D. C. Watson, M.B., C.M.; A. W. Wilcox, M.B., C.M.; A. E. Williams, M.B., C.M.; A. M. Wood, M.B., Ch.B. (with First Class Honours); *T. Wood, M.B., C.M.; *D. Young, M.B., Ch.B. (*in absentiâ*); J. C. Young (B.Sc.), M.B., C.M. (*in absentiâ*).

* Commended for their Theses. † Highly Commended for their Theses.
‡ Awarded gold medals for their Theses.

Degrees of M.B., C.M.—H. C. Gibson, G. Munro.

Degrees of Bachelor of Medicine and Bachelor of Surgery.—R. G. W. Adams, D. I. Anderson, W. W. Anderson, J. W. H. Babington, †R. B. Barnetson, W. P. Beattie, D. Bell, L. H. I. Bell, J. Bentley, A. R. Berrie, J. M. Beyers, A. S. L. Biggart, D. W. Boswell, F. T. Bowerbank, †D. Brown, W. S. M. Brown, †H. C. Buckley, V. T. Carruthers, Mildred Margaret Lindsay Cathels, †R. A. Chambers, D. M. C. Church, G. S. Clark, M.A., B.Sc., A. G. Coullie, T. E. Coulson, G. Cunningham, M.A., J. M. Dewar, R. Donaldson, M.A., †A. M. Dryden, T. H. Easton, C. G. Edmonston, E. J. Elliot, N. C. Fischer, †J. M. R. Flament, W. H. Forsyth, †L. Fourié, A. N. Fraser, W. J. Fraser, F. H. Gibson, A. G. Glass, M.A., A. M. Gloag, H. V. Goldstein, J. P. Gordon, J. M. Graham, W. W. Greer, E. J. Griffiths, T. M. Guthrie, P. A. Harry, *E. Henderson, M.A., A. W. Hogg, G. S. Husband, K. U. A. Inniss, J. Jardine, S. A. Johnston, J. Kirk, G. F. S. Landon, S. W. S. Leary, A. J. Lewis, *J. Lochhead, M.A., B.Sc., C. D. Lochrane, J. B. Lockerbie, Isabella Logie, A. D. M'Callum, H. M'Calman, M.A., W.

* Passed examinations with First-Class Honours.
† Passed examinations with Second-Class Honours.

M'Conaghy, *J. P. M'Gowan, M.A., †H. R. Macintyre, N. D. Mackay, B.Sc., R. J. Mackessack, M.A., Amy Marion Mackintosh, Elspeth Mary Macmillan, A. MacRae, M.A., A. Malseed, M. M. Mamourian, D. P. Marais, Eimée Eveline Mills, M.A., B.Sc.; L. S. Milne, G. I. Moriarty, T. B. Mouat, W. M. Munby, D. S. Murray, A. Oliver, C. D. O'Neal, A. Pampellonne, W. J. Patterson, W. Patton, B. Pickering, Florence Margaret Sarah Price, L. Ram, C. Reece, A. E. C. Rees, B.A.; H. S. Reid, C. H. G. Ritter, Margaret Helen Robertson, W. J. D. Robertson, J. Robinson, B.Sc.; Sheila Margaret Ross, C. S. Ryles, J. Saffley, J. G. B. Shand, J. I Shepherd, M.A.; F. R. Sinton, C. J. Smith, G. M'C. Smith, W. A. W. Smith, P. Steele, F. H. Stewart, M.A., B.Sc.; H. A. Stewart, †A. C. Strain, K. A. M. Stuart, S. H. S. Taylor, B.A.; H. M. Thompson, R. S. E. Todd, M.A., B.Sc.; G. H. Ussher, R. M. Walker, R. W. L. Wallace, R. H. Watt, J. H. D. Webster, D. P. D. Wilkie, F. A. Wille (*in absentiâ*), W. B. Wishart, A. C. T. Woodward, C. H. Wright, B.A.; T. Wright, Margaret C. W. Young, M.A.

Certificates in Diseases of Tropical Climates were awarded to D. I. Anderson, M.B., Ch.B.; J. W. H. Babington, M.B., Ch.B.; R. B. Barnetson, M.B., Ch.B.; J. E. H. Bennett, M.B., Ch.B.; A. R. Berry, M.B., Ch.B.; D. W. Boswell, M.B., Ch.B.; Mildred M. L. Cathels, M.B., Ch.B.; R. A. Chambers, M.B., Ch.B.; G. S. Clark, M.A., B.Sc., M.B., Ch.B.; R. Donaldson, M.A., M.B., Ch.B.; A. M. Dryden, M.B., Ch.; T. H. Easton, M.B., Ch.B.; E. J. Elliot, M.B., Ch.B.; J. M. R. Flament, M.B., Ch.B.; W. H. Forsyth, M.B., Ch.B.; A. N. Fraser, M.B., Ch.B.; W. J. Fraser, M.B., Ch.B.; J. P. Gordon, M.B., Ch.B.; J. M. Graham, M.B., Ch.B.; P. A. Harry, M.B., Ch.B.; E. Henderson, M.A., M.B., Ch.B.; K. U. A. Inniss, M.B., Ch.B.; J. Lochhead, M.A., B.Sc., M.B., Ch.B.; W. M'Conaghy, M.B., Ch.B.; J. P. M'Gowan, M.A., M.B., Ch.B.; H. R. Macintyre, M.B., Ch.B.; Amy M. Mackintosh, M.B., Ch.B.; D. Mackinnon, M.B., Ch.B.; Elspeth M. Macmillan, M.B., Ch.B.; J. G. M'Naught, M.A., M.D., C.M.; L. S. Milne, M.B., Ch.B.; W. M. Munby, M.B., Ch.B.; L. Ram, M.B., Ch.B.; A. E. C. Rees, B.A., M.B., Ch.B.; Margaret H. Robertson, M.B., Ch.B.; W. J. D. Robertson, M.B., C.B.; J. Robinson, B.Sc., M.B., Ch.B.; Sheila M. Ross, M.B., Ch.B.; F. H. Stewart, M.A., B.Sc., M.B., Ch.B.; A. C. Strain, M.B., Ch.B.; R. S. E. Todd, M.A., B.Sc., M.B., Ch.B.; J. H. D. Webster, M.B., Ch.B.

The following prizes and scholarships were awarded:—The

* Passed examinations with First-Class Honours.
* Passed examinations with Second-Class Honours.

Ettles Scholarship—J. Lochhead, M.A., B.Sc., M.B., Ch.B. The Allan Fellowship in Clinical Medicine and Clinical Surgery—W. J. Fraser, M.B., Ch.B. The Freeland Barbour Fellowship—J. Lochhead, M.A., B.Sc., M.B., Ch.B. The Buchanan Scholarship in Gynaecology—J. Lochhead, M.A., B.Sc., M.B., Ch.B. The James Scott Scholarship in Midwifery—E. Henderson, M.A., M.B., Ch.B. The Mouat Scholarship in Practice of Physic—H. R. Macintyre, M.B., Ch.B. The Stark Scholarship in Clinical Medicine—L. S. Milne, M.B., Ch.B. The M'Cosh Graduate's and Medical Bursaries—W. C. Morton, M.A., M.B., Ch.B. The Gunning Victoria Jubilee Prize in Surgery—L. T. Price, M.B., Ch.B. The Beaney Prize in Anatomy and Surgery—W. J. Fraser, M.B., Ch.B. The Pattison Prize in Clinical Surgery—J. P. S. Jamieson. The Conan Doyle Prize—L. Fourie, M.B., Ch.B. The Wightman Prize in Clinical Medicine—W. J. Maloney. The Dorothy Gilfillan Memorial Prize—Margaret Helen Robertson, M.B., Ch.B. The Ellis Prize in Physiology—A. N. Bruce, B.Sc.

Scholarships in Science—The Baxter Scholarship in Physical Science has been awarded to P. D. Innes, M.A., B.Sc.; *proxime accessit*, A. H. Gardner, M.A., B.Sc. The Baxter Scholarship in Natural Science has been awarded to J. A. Gunn, M.A., B.Sc. The Mackay-Smith Scholarship in Chemistry has been awarded to R. J. Nicholson, M.A., B.Sc.; *proxime accessit*, N. K. Pillai, B.A.

Professor D. J. Cunningham, F.R.S., Promoter of the Faculty of Medicine, then delivered the usual address to the new graduates, his subject being "The Evolution of the Graduation Ceremony." He described in detail the various symbols connected with the "capping" of graduates which had been employed in various countries from mediæval times down to the present period.

At the conclusion of the graduation ceremony the honorary graduates were entertained at luncheon by the University Union, when Mr John Morley replied for the guests. Sir Walter Hely-Hutchinson, Emeritus Professor Butcher, Professor William Thomson, Principal Sir William Turner, and Professor Annandale also spoke.

The following is the list of passes at the recent professional examinations in medicine and surgery:—

First Professional Examination.—J. Aiken, H. M. Anderson, A. H. T. Andrew, W. Bainbridge, A. Baldie, Christiana H. Barr, Margaret W. Bartholomew, Lydia De la T. Bateman, Elizabeth M. A. Baxter, A. R. Bearn, J. Black, J. Brander, Sarah E. Buyers, E. Cansfield, J. T. Carson, Jean G. Cathels, P. H. Chauvin, D. G. Cooper, H. S. Cormack, F. G. Cowan, J. C. Craig, M.A.; W.

S. Crawford, Emilie C. Creaser, J. M. Dalrymple, P. Davies, F. Dillon, A. E. Drynan, A. C. England, C. Gamble, T. Gardner, M. Gavin, A. Gibson, M.A. (with distinction); J. Gilchrist, A. I. Girdwood, J. A. Gordon, A. T. Gowan, J. C. B. Grant, R. Hannah, J. Hewat, A. E. Huckett, P. F. Hugo, J. D. Ingram, K. R. K. Iyengar, A. Jamieson, J. A. Jamieson, F. E. Jardine, W. P. S. Johnson, R. O. Jollie, E. W. Kirk, R. Krause, F. R. Laing, C. L. Laurent, R. D. Laurie, H. L. Lawrence, D. C. Lee, Margaret M. Lindsay, V. D. O. Logan, G. H. Lowe, R. M'Adoo, Margaret M'Cahon, Alexandra B. MacCallum, R. MacDonald, R. F. D. MacGregor, D. L. MacKenna, K. Mackenzie, A. K. Maclachlan, W. M. Macnab, D. Macnair, J. Malloch, J. Marshall (with distinction), Eva Meredith, W. A. Miller, A. R. Milroy, J. A. Mitchell, V. P. Mondon, F. L. Moore, Anna L. Muncaster, W. Murdie, M.A.; C. C. Murray, C. T. Newton, I. A. van Nickerk, A. C. Norman, C. A. Paterson, A. P. Pearson, J. H. Peek, H. R. A. Philip, Laura W. Pugh, F. W. Rayment, F. E. Reynolds, E. W. Richards, C. Robertson, B.A., Marguerite Ross, S. Rowlands, D. H. Russell, C. S. Sandeman, W. A. Scobie, J. Scott, R. L. Scott, Wilhelmina Sievwright, B.A.; J. C. Simpson, J. T. Simson, E. W. Smerdon, T. Smyth, W. N. van Someron, J. E. Spence, R. H. Tait, J. J. Thomson, N. G. Thornley, R. Verel, F. H. de Villiers, A. A. Walbrugh, Dora M. Walker, E. A. Walker, W. O. Walker, L. E. B. Ward, W. H. te Water, F. W. Waterworth, A. P. Watson, M.A.; H. B. Watson, M.A.; N. J. Watt, H. L. W. Wemyss, E. V. Williams, G. Wilson, A. G. Yates, M.A.; W. A. Young.

Second Professional Examination.—G. P. Adshead, J. Alexander, M.A.; A. Arthur, A. F. Babonau, E. Banks, F. Blamire, J. D. Bowie, H. F. Briggs, Alice M. Burn, E. Burnet, B.A.; W. P. Chrystall, J. A. Currell, J. S. Daniell, R. Davidson, J. D. C. Duncan, J. S. Edwards, Mary S. Finlayson, F. S. B. Fletcher, K. N. Ghosh, J. E. Gordon, E. R. Grieveson, B.A.; D. K. Henderson, W. M. P. Henderson (with distinction), Nettie D. Hendrie, J. M'A. Hill, A. S. Holden, S. Jackson, W. W. Johns, W. T. A. Jolly (with distinction), R. L. Jones, Beatrice Kippenberger, J. H. Lamb, S. B. Legge, J. M'Cutcheon, A. T. M'Donald, G. M'Mullan, W. J. Macnab, A. S. Mactavish, L. R. H. P. Marshall, A. H. M. Maxwell, J. E. Murray, Janet M. Murray, M.A.; M. A. D. Naoroji, A. J. P. Nowell, A. S. Paterson, Edith G. Pycroft, G. Y. Richardson, W. R. Ridley, W. G. Rivers, G. Robertson, T. Robertson, W. O. Sclater (with distinction), H. L. Sells, S. C. Sen, E. D. Simson, R. St C. Steuart, J. A. Taylor, E. W. Vaughan, A. S. Walker, F. E. Wall.

Third Professional Examination.—M. A. Ansari, A. W. Atkinson, A. J. Beattie, E. J. Black, N. Black, J. Brennan, G.

Britto, T. G. Brown, B.Sc.; J. S. Caldwell, T. Campbell, N. S. Carmichael, J. Chisholm, F. W. Cragg, Davidina R. J. Davidson, E. G. Deverell, F. H. Dickson, M. G. Dill, J. Dundas, D. Eakin, H. F. Fenton, L. P. M. Gardner, H. S. Gaskell, E. G. Girdwood, J. A. Glover, M.A.; E. J. C. Groves, J. T. Gunn, H. S. A. Hogg, G. H. Howe, J. H. Hume, J. F. James, J. R. Kerr, R. M. Liddell, J. Lindsay, J. A. Loughridge, P. M'Dermid, D. F. Mackenzie, W. Magill, W. J. Maloney, J. A. Mathers, F. C. Mills, M.A.; H. Mowat, R. E. Moyes, E. B. Munro, R. E. U. Newman, R. H. Nolan, H. J. Norman, C. R. O'Brien, J. S. Orwin, J. L. Pearce, D. E. C. Pottinger, G. Raubenheimer, D. G. Reid, H. D. Robb, T. E. Roberts, J. R. Robertson, H. M. Sauzier, J. O. Shircore, E. M. Simmers, A. Simpson, W. T. Smith, W. J. Taggart, H. V. Taylor, J. H. du Toit, A. Wright, R. Wilkins, C. R. Wills, and J. T. Young. The following candidate passed in Pathology of the Third Professional Examination: F. J. G. Tocher.

Edinburgh University Medical Passes

THE following is the official list of passes at the recent professional examinations for degrees in Medicine and Surgery:—

First Professional Examination. — James Aiken, H. M. Anderson, A. H. T. Andrew, William Bainbridge, Alexander Baldie, Christina H. Barr, Margaret W. Bartholomew, Lydia D. la Trobe Bateman, Elizabeth M. A. Baxter, A. R. Bearn, James Black, John Brander, Sarah F. Buyers, Ellison Cansfield, J. T. Carson, Jean G. Cathels, P. H. Chauvin, D. G. Cooper, H. S. Cormack, F. G. Cowan, J. C. Craig, M.A., W. S. Crawford, Emilie C. Creaser, J. M. Dalrymple, Purser Davies, Fred. Dillon, A. E. Drynam, A. C. England, Cromwell Gamble, Thomas Gardner, Michael Gavin, Alexander Gibson, M.A. (with distinction), John Gilchrist, A. I. Girdwood, J. A. Gordon, A. T. Gowan, J. C. B. Grant, Robert Hannah, John Hewat, A. E. Huckett, P. F. Hugo, J. D. Ingram, K. R. K. Iyengar, Andrew Jamieson, J. A. Jamieson, F. E. Jardine, W. P. S. Johnson, R. O. Jollie, E. W. Kirk, Robert Krause, F. R. Laing, C. L. Laurent, R. D. Laurie, H. R. Lawrence, D. C. Lee, Margaret M. Lindsay, V. D. O. Logan, G. H. Lowe, Robert M'Adoo, Margaret M'Cahon, Alexandra B. MacCallum, Ranald MacDonald, R. F. D. MacGregor, D. L. MacKenna, Kenneth Mackenzie, A. K. Maclachlan, W. M. Macnab, David Macnair, John Malloch, John Marshall (with distinction), Eva Meredith, W. A. Miller, A. R. Milroy, J. A. Mitchell, V. P. Mondon, F. L. Moore, Anna L. Muncaster, William Murdie, M.A., C. C.

Murray, C. T. Newton, I. A. van Niekerk, A. C. Norman, C. A. Paterson, A. P. Pearson, J. H. Peek, H. R. A. Philp, Laura W. Pugh, F. W. Rayment, F. E. Reynolds, E. W. Richards, Charles Robertson, B.A., Marguerite Ross, Samuel Rowlands, D. H. Russell, C. S. Sandeman, W. A. Scobie, John Scott, R. L. Scott, Wilhelmina Sievwright, B.A., J. C. Simpson, J. T. Simson, E. W. Smerdon, Thomas Smyth, W. N. van Someren, J. E. Spence, R. H. Tait, J. J. Thomson, N. G. Thornley, Raymond Verel, F. H. de Villiers, A. A. Walbrugh, Dora M. Walker, E. A. Walker, W. O. Walker, L. E. B. Ward, W. H. te Water, F. W. Waterworth, A. P. Watson, M.A., H. B. Watson, M.A., N. J. Watt, H. L. Watson Wemyss, E. V. Williams, Gordon Wilson, A. G. Yates, M.A., W. A. Young.

Second Professional Examination.—G. P. Adshead, John Alexander, M.A., Alfred Arthur, A. F. Babonau, Ernest Banks, Frank Blamire, J. D. Bowie, H. F. Briggs, Alice M. Burn, Edward Burnet, B.A., W. P. Chrystall, J. A. Currell, J. S. Daniell, Richard Davidson, J. D. C. Duncan, J. S. Edwards, Mary S. Finlayson, F. S. B. Fletcher, K. N. Ghosh, J. E. Gordon, E. R. Grieveson, B.A., D. K. Henderson, W. M. P. Henderson (with distinction), Nettie D. Hendrie, J. M'Adam Hill, A. S. Holden, Spencer Jackson, W. W. Johns, W. T. A. Jolly (with distinction), R. Lloyd Jones, Beatrice Kippenberger, J. H. Lamb, S. B. Legge, John M'Cutcheon, A. T. M'Donald, George M'Mullan, W. J. Macnab, A. S. Mactavish, L. R. H. P. Marshall, A. H. M. Maxwell, J. E. Murray, Janet M. Murray, M.A., Meher A. D. Naoroji, A. J. P. Nowell, A. S. Paterson, Edith G. Pycroft, G. Y. Richardson, W. R. Ridley, W. G. Rivers, Graham Robertson, Thomas Robertson, W. O. Sclater (with distinction), H. L. Sells, Subrata Chunder Sen, E. D. Simson, R. St C. Steuart, J. A. Taylor, E. W. Vaughan, A. S. Walker, F. E. Wall.

Third Professional Examination.—Mukhtar Ahmed Ansari A. W. Atkinson, A. J. Beattie, E. J. Black, Norman Black, James Brennan, Gilbert Britto, T. Graham Brown, B.Sc., J. S. Caldwell, Thomas Campbell, N. S. Carmichael, John Chisholm, F. W. Cragg, Davidina R. J. Davidson, E. G. Deverell, F. H. Dickson, M. G. Dill, James Dundas, David Eakin, H. F. Fenton, L. P. M. Gardner, H. S. Gaskell, E. G. Girdwood, J. A. Glover, M.A., E. J. C. Groves, J. T. Gunn, H. S. A. Hogg, G. H. Howe, J. H. Hume, J. F. James, J. R. Kerr, R. M. Liddell, John Lindsay, J. A. Loughridge, Peter M'Dermid, D. F. Mackenzie, William Magill, W. J. Maloney, J. A. Mathers, F. C. Mills, M.A., Harold Mowat, R. E. Moyes, E. B. Munro, R. E. U. Newman, R. H. Nolan, H. J. Norman, C. R. O'Brien, J. S. Orwin, J. L. Pearce, D. E. C. Pottinger, Gustav Raubenheimer, D. G. Reid, H. D. Robb, T. E. Roberts, J. R. Robertson, H. M. Sauzier,

J. O. Shircore, E. M. Simmers, Archibald Simpson, W. Torrance Smith, W. J. Taggart, H. V. Taylor, J. H. du Toit, Andrew Wight, Richard Wilkins, O. R. Wills, J. T. Young.

UNIVERSITY OF GLASGOW

Graduation Ceremony

THE medical graduation ceremony, which is always held at the close of the summer session, took place on July 19th in Bute Hall. There was a large attendance of the friends of the graduates. The Very Rev. Principal Story presided, and the following gentlemen were presented for their degrees by Professor Murdoch Cameron :—

Doctors of Medicine (*M.D.*).—*I. With Commendation.*—E. A. Walker, M.A., M.B., C.M. (Thesis: Ten Successive Laparotomies; their History, Clinical Aspects, and Technique.) *II. Ordinary Degree.*—J. J. Boyd, M.B., C.M. (Thesis: Scarlet Fever from the Preventive Medicine Standpoint, with special reference to the position of Hospital Isolation in controlling its spread.) A. Girvan, M.B., C.M. (Thesis: Acute Eczema in Adults and Children.) J. M'Glashan, M.B., C.M. (Thesis: An Occupational Disease.)

Bachelors of Medicine and Masters in Surgery (*M.B., C.M.*).—S. Dunbar, E. M. Watkins.

Bachelors of Medicine and Bachelors of Surgery (*M.B., Ch.B.*). —*I. Honours.*—*R. B. Carslaw, M.A., G. M. Gray. *II. Commendation.*—J. W. Thomson, W. Templeton, H. H. Fulton, J. D. M'Callum, M.A., T. D. M'Ewan, R. M'N. Wilson, G. G. Smith, B.Sc., A. M. Pollock, B. H. Robertson, M.A., B.Sc., D. R. Reid, J. Murdoch. *III. Ordinary Degrees.*—B. S. Alexander, A. C. Amy, H. G. Anderson, J. R. S. Anderson, R. D. Bell, M.A., D. Blackley, C. Brown, G. Y. Caldwell, Roberta Campbell, T. M. Campbell, M.A., P. Carrick, M.A., J. A. Cowie, B.A., B.Sc., T. T. M. Dishington, C. M. Drew, M.A., J. Graham, B.Sc., J. C. Henderson, J. R. Kerr, J. Kerr, Ethel M. Lochhead, P. Lowe, M.A., B.Sc., T. S. Macaulay, D. C. M'Cormick, N. M'Dougall, J. B. M'Ewan, D. Macfadyen, J. M'Farlane, A. S. M. Macgregor, J. M'Houl, R. Mackinnon, A. B. M'Pherson, J. R. M'Vail, J. Marshall, A. Meek, Margaret W. Millar, D. R. Mitchell, J. Muir, A. H. Napier, G. C. Neilson, T. Orr, Charlotte R. Park, H. H. Patrick, J. C. Pickup, J. Porter, W. M. Rae, W. Rankin, M.A.,

* Mr Carslaw gains the Brunton Memorial Prize of £10, awarded to the most distinguished graduate in medicine of the year.

L. D. Shaw, Jessie M. Stewart, W. C. Stewart, M. R. Taylor, W. Y. Turner, M.A., H. F. Warwick, Annie M. Yates, H. Young.

After the "capping" Professor M'Call Anderson delivered a short address to the graduates. He began by congratulating them on becoming members of a noble and honourable profession, and went on to discuss the many different branches of the profession, and the special attractions which these might present to different individuals.

Royal College of Surgeons of Edinburgh

AT a meeting of the College held on 28th inst., the following gentlemen, having passed the necessary Examinations, were admitted Fellows of the College:—David Macrae Aitken, M.B., Ch.B., Edinburgh; Robert Gordon Bell, M.D., Sunderland; Chiranjiva Bharadwaja, L. R. C. S. E., Edinburgh; William Thomas Chenhall, M.D., Sydney; Frederick Gardiner, M.D., Edinburgh; Alfred Griffiths, M.B., C.M., Falkirk; Arthur Gwyther, M.B., C.M., Captain, I.M.S.; Thomas Dufour Halahan, M.B., Ch.B., Devonport; Claude Somerville Hawkes, M.R.C.S., Eng., Queensland; Edmund Moritz Illington, M.R.C.S.Eng., Captain, I.M.S.; James Frederick Merrillees, M.B., Ch.B., Melbourne; Thomas Mill, M.B., Ch.B., Cardiff; Philip Henry Mules, M.B., L.R.C.S.E., Edinburgh; Lionel Charles Peel Ritchie, M.B., Ch.B., Edinburgh; Oscar Bagster Trumper, M.B., Ch.B., Market Rasen; and Henry Woolmington Webber, M.D., M.R.C.S.Eng., Plymouth.

The Medal and set of books forming the "Bathgate Memorial Prize" presented to the College by Colonel William Lorimer Bathgate in memory of his late father William M'Phune Bathgate, Fellow of the College, was awarded to Mr Robert Macnaught Glover, Carlton House, Dumfries.

Royal College of Physicians of Edinburgh; Royal College of Surgeons of Edinburgh; and Faculty of Physicians and Surgeons of Glasgow.

THE quarterly examinations of the above Board, held in Edinburgh, were concluded on the 22nd inst., with the following results:—

First Examination, Four Years' Course.—Of three candidates

entered the following passed the examination—William Clegg-Newton, Manchester.

First Examination, Five Years' Course. — Of thirty-nine candidates entered the following thirteen passed the examination:—James Reid, Belfast; Richard Baron Michael Sullivan, Monaghan; George Hector Urquhart, Eskbank; George Walter Rundle, Australia; Bernard Matlachi Lynam, Ireland; Oliver Carlyle, London (with distinction); Rustom Nusserwanji Coorlawala, India; Norman Grenville Walshe-Davidson, Ballycastle; William Rutherford Waddell, Belfast; James Bolton Kelso, Belfast; Alfred Benjamin Bateman, Cork; Charles Liston Stewart, Calcutta; and Maurice Cameron Anderson, Edinburgh; and two passed in Physics, six in Elementary Biology, and two in Chemistry.

Second Examination, Four Years' Course.—Of three candidates entered the following two passed the examination:—Leonard Clarke Webster, Tasmania, and Edward Rigby Stephenson Hale, Derbyshire, and one passed in Anatomy.

Second Examination, Five Years' Course.—Of twenty-six candidates entered the following sixteen passed the examination:—William Linton Watson, Edinburgh (with distinction); George Ernest Nash, Co. Cork; Robert Kay Nisbet, Edinburgh; William Cape Doughty, London; William James Valentine Curtain, Australia (with distinction); Taylor David Murison, India; George Edward Walker Henderson, Edinburgh; Arthur Melville Davie, Glasgow; Robert Frederick Claude Hamilton Buchanan, England; Arnold M'Millan, Belfast; Nathaniel Moxon, St Helens; John Scott Ward, Queenstown (with distinction); Rustom Nusserwanji Coorlawala, Satara; Alexander Rae, Banffshire; George Banks, Edinburgh; and Robert Mathia Jones, Holywell; and one passed in Anatomy, and one passed in Physiology.

Third Examination, Five Years' Course.—Of thirty-seven candidates entered the following sixteen passed the examination:—Archibald M'Kendrick, Kirkcaldy; Angus Cameron Mackay, Argyllshire; Charles Augustus Eamonson Ring, Kent; Carlo Ferruccio Fiaschi, Sydney; Anna Mary Mulholland, Ireland; Ardeshir Cowasji Dhondy, Bombay; Sites Chunder Chuckerbutty, Calcutta; Nicholas Daunt Sweetnam, Cork; Dirk Johannes Neethling, Cape Colony; Nuno Joseph Rodrigues, Bombay; Duncombe Steele-Perkins, Exeter; Robert Percy Hosford, Co. Cork; Robert Thomas Aloysius Patchett, Lancashire; John Coffey, Melbourne; Bernard William Dakers, Hawick; and Francis William Cooper, Enniskillen; and three passed in Materia Medica.

Final Examination.—Of sixty-two candidates entered the

following thirty passed the examination and were admitted L.R.C.P.E., L.R.C.S.E., and L.F.P. & S.G.:—Charles Henry Thomas, Canada; William Herbert Boalth, Kampti, India; Broderick Edward Middleton Newland, Bangalore; Bernard Beaumont Westlake, Chippenham; Eyre Vincent Smith, Kingston, Jamaica; Bertram Ingram, Victoria; James Watson, Edinburgh; Arthur George Thompson, Ontario; Franklin Christian Edwards, South Dakota; Frederick Etherington, Ontario; Edward Rainsford Mumford, Norwich; Charles Richard Whittaker, Lancashire; Charles Grange M'Greer, Ontario; Annjuta Kellgren Cyriax, London; Daniel Michael Donovan, Cork; James Grieve Cormack, Anstruther; William Boyd, Co. Derry; Lambert Kenneth Rodriguez, Travancore; Eileen Josephine Fitzgerald, Melbourne; Henry Gordon Campbell, Dundee; Dwarkanath Dharmaji Kamat, Bombay; Alexander Douglas Fox, Brighton; Ramchandra Kashinath Dhuru, Bombay; Nigel Oliphant, St Andrews; David Arnold Hastings, Ireland; Vasantio Dinanath Madgavkar, Bombay; Narindra Singh Sodhi, Punjab; Sorabji Jamasji Bhathena, Bombay; William Vincent Saint John Sutton, Cork; and Joseph Simon de Souza, Bombay; and five passed in Medicine and Therapeutics, nine in Midwifery, and five in Medical Jurisprudence.

Recent Literature

CRITICAL SUMMARIES AND ABSTRACTS

SURGERY

SYPHILIS AND GONORRHŒA

By A. A. SCOT SKIRVING, C.M.G., F.R.C.S.,
Assistant Surgeon, Royal Infirmary, Edinburgh

Continental Methods of Treating Syphilis.—The special number of the *Practitioner* for July of this year is entirely devoted to the subject of syphilis, and the greater portion of it to the question of treatment. Excellent articles, specially written for the journal by specialists at Aix-la-Chapelle, Wiesbaden, and Paris, describe at some length the practice followed at these places.

To those who consider that the methods of inunction and injection are far too seldom made use of in this country, the appearance of these articles will seem most opportune. Further,

they should prove specially valuable to those who, perhaps unaware of the improved technique associated with these methods, still consider that inunction and salivation are practically synonymous terms. The articles, being so accessible, do not call for further comment. It is interesting, however, to note in passing that both the writers on inunction recommend the naked hand as superior to the glass instrument lately so much in vogue. One is glad, also, to notice that no attempt is made by any of the authors to claim that the Spa treatment is essential to the cure of syphilis. On the contrary, it is freely admitted that inunction can be carried out at home. Readers, however, who have sent English patients to Wiesbaden, Aachen, or Aix-les-Bains, out of season, and, above all, during winter, will consider it a pity that the statement is made that "the cure can be taken at any time." No doubt it can, but the patient does not desire a second similar "cure"!

Recent Experimental Work in Syphilis.—In the abstract on syphilis in the May number of this year's *Scot. Med. and Surg. Journal*, reference was made to the work of Metchnikoff and Roux. These observers had established the fact that syphilis can be communicated by inoculation to chimpanzees, the disease presenting the same character as in man. These results had also been confirmed by Lassar of Berlin. Metchnikoff and Roux have since continued their researches (*Annales d'Institut. Pasteur*, 1903).

Twelve macaque monkeys were inoculated. Of these twelve inoculations, the results in eight cases were completely negative. In four cases, however, slight manifestations of syphilis followed, viz., the appearance of papules in from four to eight days' time, but no glandular enlargements or secondary manifestations, such as had been observed in the case of the chimpanzees. It was evident, therefore, that the macaque possessed either a natural resistance to human syphilitic virus, or could attenuate the poison in a way that the chimpanzee was not able to do.

These results suggested the possibility of obtaining some form of protective vaccine from "syphilised" macaques. Accordingly, the experimenters inoculated a chimpanzee with discharge taken from the papule of a syphilised macaque. Inoculation occurred of the same mild character as the original lesion on the macaque, and all trace of it disappeared in about thirty days. The chimpanzee was then inoculated anew, this time with discharge from a human hard chancre. No local disturbance followed, the only phenomenon observed being a general

adenitis, while, up to the date of the publication of the article (sixty-three days after the second inoculation), no secondaries had appeared. The authors are carrying out further researches.

The search for the organism of syphilis, like that of cancer, still goes on. So many organisms, however, have now been credited with the causation of syphilis, that people are becoming wary, and it is probable that when the real microbe is found at last, its discoverer will have some difficulty in convincing the profession. M. René Horaud is the latest claimant for the honour (*L'Agent pathogène de la Syphilis*, *Lyon Médical*, Feb. 1904). M. Horaud's parasite resembles a spermatozoon in shape and movements. It was first discovered by him in the blood. For this reason he terms it "un hémoprotiste." It has, however, an almost bewildering number of evolution forms, such as spores, crescents, spheres, rosettes, etc. It is to be found in the blood in both congenital and acquired syphilis. M. Horaud has also seen it on the surface of primary chancres, on mucous patches, in the discharge of tertiary ulcerations, and even in the lymphatics. Illustrations of the various forms accompany the paper. The increased number of blood platelets found in syphilitics, the anæmia, etc., are all due to the action of this parasite. In doubtful cases, also, a microscopic examination of a blood film, stained according to the directions given in the paper, will clear up the diagnosis. From these remarks, the reader will gather that M. Horaud does not lack confidence. So far, however, the discovery has not been confirmed by others.

The Treatment of Gonorrhœa by Packing the Urethra.—It must be confessed that the treatment of gonorrhœa, in spite of the vast armamentarium of drugs that have been directed against it, still remains one of the reproaches of surgery. The profession, therefore, cannot afford to pass by any new avenue of attack without a trial. Moreover, gonorrhœa is so essentially local a trouble that any local method of dealing with it deserves special consideration. Now, the chief explanations of failure in cases where injections have been used may be summarised as follows: (1) that they may not be strong enough to kill the particular gonococci present without at the same time injuring the mucous membrane; (2) that they only deal with the surface gonococci; (3) that they can only be applied for a short period; (4) that the walls of the urethra are left in apposition in the intervals between the injections, thus allowing retention of secretion and favouring multiplication of germs.

In the method of packing the urethra employed by S. T. Rucker (*American Medicine*, May 14, 1904), it will be easily

seen that, if it can be satisfactorily carried out, two, at any rate, of these objections do not apply, while the chance of reaching the more deeply situated gonococci is increased. The technique is as follows:—

The patient first passes water; the urethra is next irrigated with 1-4000 hot solution of permanganate of potash. The "packer," a sterilised, hollow, straight instrument, nine inches in length, is then *gently* introduced after lubrication, the penis being held in the left hand, the packer in the right. To lubricate the packer, it is dipped in the same solution in which the dressing is kept. The following is the formula:—

℞ Icthyol.
Resorcin ana, grs. 40.
Balsum Peru, ʒ iv.
Ol Ricini, ad ℥ iv.

The dressing, of which soft-spun cotton-cord is best, is then passed into the packer by means of the "piston or feeder," which is made of steel, and has a forked point. The packer is now gradually withdrawn as the dressing is fed through. When the packing is completed, about a quarter of an inch of dressing is left protruding from the meatus. A little lint is placed over this. The patient is instructed to go as long as possible without urinating. "The average patient will go from five to eight hours." The packing is best done at bed time. The dressing is removed by ballooning out the urethra with urine, or simply by gentle traction. Packing is done daily until discharge ceases. This, according to Rucker, takes place in two to five days in cases of acute gonorrhœa. In some aggravated cases it is best to pack morning and evening until the discharge ceases. In chronic cases the results are even more remarkable, all discharge stopping after one or two applications. After discharge has ceased, packing is done every other day for ten or fourteen days in acute cases, every two or three days in chronic cases.

The surgeon may be disappointed in his first attempts. Accordingly, stress is laid on several points. On no account must the operation cause bleeding or give rise to much pain. The packer must, therefore, be very smooth, and Rucker now employs a glass one. The point is rounded. If it be made of the toughest flint glass and without flaw, the danger of breaking is very slight. Several sizes should be kept. Both packer and feeder should have a graduated scale to show the depth of insertion. In anterior gonorrhœa the packer is only inserted about four inches; in posterior gonorrhœa it is passed right into the prostatic urethra. Even here the packer should be straight,

and not curved. If a stricture is present, it must previously be dilated. In no cases must the urethra be packed tightly.

Rucker had employed the method for fifteen months with the best results, and had received many favourable comments from physicians who had been equally successful. It is unfortunate, however, that the author does not say whether he has had any failures! One cannot, also, refrain from expressing surprise that the average patient with acute gonorrhœa can retain his dressing for five to eight hours.

OBSTETRICS

THE MANAGEMENT OF PREGNANCY WITH HEART DISEASE

By R. G. M'KERRON, M.A., M.D.,
Physician to the Maternity Hospital, Aberdeen

AT the recent meeting of the British Medical Association Dr James Mackenzie, of Burnley, read a valuable paper, embodying the result of investigations extending over many years, on the maternal heart in pregnancy, and on some points connected with the management of pregnant women with heart disease. Before directing his attention to the influence of pregnancy on the cardio-vascular system, Dr Mackenzie was already an acknowledged authority on heart disease, and this adds greatly to the value of his observations.

There are few subjects which stand more in need of investigation. A study of recent literature will show that the most conflicting views prevail in regard to the effects of pregnancy on the normal circulation and on existing heart disease; and the result has naturally been opposite views as to the treatment which should be adopted not only during pregnancy, but during labour.

Dr Mackenzie's paper was followed by an interesting communication from Dr Nicholson. Both papers were, unfortunately we think, read before the medical section, the atmosphere of which did not prove congenial for the discussion of the important obstetrical questions which were raised.

In this review I propose to limit myself mainly to the treatment of pregnancy with heart disease viewed in the light of recent investigations.

That pregnancy exercises an unfavourable influence on existing heart disease is admitted by almost all writers. The explanation of the injurious effects on the heart is to be found, not in any one cause, but, as Leyden points out, in a series of

factors. Of these the most important are: (1) the increased work and greater activity of the heart during pregnancy; (2) dilatation of the heart, which makes the defective valve still more defective and intensifies the effects of the lesion; (3) diminished thoracic expansion; though the vital capacity of the chest has been shown to be undiminished, the latitude of healthy respiration is limited, and hence pulmonary disturbances more readily occur in pregnant women; (4) the altered condition of the blood, predisposing to further defective nutrition of the heart; (5) the fatty degeneration of the cardiac muscle to which, as Virchow and others have shown, pregnancy predisposes; (6) the increased tendency to intercurrent attacks of endocarditis; (7) the physical and psychical effects of labour, more especially the great strain imposed on the heart by the sudden elevations of blood pressure which take place during the pains.

On one point, perhaps the most important obstetrically, it is to be regretted that neither of the papers threw much light, namely, the state of the circulation immediately after the expulsion of the child. Meantime, there are two diametrically opposite views, each supported by clinical and even by post-mortem evidence. The most generally accepted, and probably the correct view, is that the birth of the child, and consequent retraction of the uterus, leads to an overflow of blood to the right heart, with engorgement of it and of the lungs. Mackenzie, though he adopts this view, is unable to adduce fresh proof. The only interpretation which he can put on the pulse tracings taken at this time, is that they indicate cardiac exhaustion. The other view, which originated with Fritsch and which has been supported more recently by Guérard and Fellner, is that the diminution in the intra-abdominal pressure following the expulsion of the child leads to an accumulation of the extra blood in the large abdominal and pelvic veins. Too little blood thus reaches the right ventricle, with the result that there is underfilling of the heart and cardiac anæmia. The point is one of great practical importance, and, it is to be hoped, will not be long left in this uncertain position.

Treatment.—The question has been frequently discussed whether, in view of the dangers to which pregnancy exposes, a woman with heart disease should be permitted to marry. It is now generally admitted that when the general condition and the cardiac compensation are good, consent may be given. Some authorities are of opinion that marriage should be forbidden in all cases of mitral stenosis, but Mackenzie thinks this unnecessary, provided the compensation is good and the apex beat within the nipple line and due to the left, not to the

right, ventricle. In all cases, however, where the margin of compensation is small, or where compensatory disturbances have occurred, or exist, marriage should be absolutely prohibited (Feis, Fellner, etc.). Leyden and Guérard go further, and insist that consent should be withheld in all cases of severe lesion, irrespective of the present state of compensation.

When pregnancy occurs, much may be done during it to minimise the injurious effects on the heart. Throughout the whole period the woman should be kept under close supervision. A strict carefully-thought-out regimen should be enjoined, and greater attention than is usually exercised should be given to carrying out its details. The woman should be warned against everything likely to aggravate the condition of the heart, against excessive bodily exertion and mental excitement of all kinds. Colds, and more particularly bronchial catarrhs, must be guarded against, and, when they occur, must be carefully treated. In women of the lower classes, and more especially if multiparæ, Feis agrees with Löhlein that the last weeks, or even months, of pregnancy should, if possible, be spent in hospital.

Apart from these general directions, the treatment in favourable cases should be expectant. In the absence of definite indications medicinal treatment is unnecessary. In less favourable cases general and cardiac tonics will be required. Anæmia should always be treated. Should marked œdema occur, or evidences of commencing pulmonary congestion be found, the patient should be confined to bed and put on an exclusively milk diet. As a vasodilator and diuretic in these cases Nicholson advises thyroid extract. He reports two cases in which its administration was followed by rapid disappearance of the œdema and improvement in the general condition.

Should pregnancy be artificially interrupted in severe cases of heart disease? If not the most important, this is certainly the most controversial question connected with the management of this complication. Great difference of opinion will be found, not only as to the utility of the procedure, but as to the circumstances in which it should be employed. Under the influence of the late Dr Angus Macdonald, who maintained that nothing was to be gained by inducing labour, the earlier writers were opposed to its employment save in exceptional cases. The objection chiefly urged against it was that the psychical strain and consequent disturbance of the action of the heart and the condition of the lungs were greater than in spontaneous labour. It is not easy to see why this should be so, but admitting it, the extra danger is less than would be involved in the continuance of pregnancy. As Leyden points

out, the gain of even a few weeks in so distressing a condition is an infinite one.

In the more recent literature there is evidence that the induction of labour in severe heart disease with failing compensation is gaining ground. To those who have had the opportunity of seeing the marked improvement which immediately follows spontaneous premature labour, artificial induction would seem to be the most natural and effective method of treatment. That it occasionally leads to a fatal issue is, in the writer's opinion, no argument against it, but an argument rather for its earlier employment. Guérard maintains that the operation should be resorted to much more frequently than it now is, while Leyden is of opinion that it is not only justifiable but indicated when compensatory disturbances occur and, in spite of treatment, persist. The life of the child, in the circumstances almost certain to be lost, should not be considered. Besides saving the woman from the continuance of a distressing condition which not only acts injuriously on the heart but, as Leyden has pointed out, so exhausts the bodily and mental powers that, after delivery, the patient declines and collapses, premature labour, even when induced, would seem to involve less actual danger. Though dilatation may be slow, the expulsive or dangerous stage is usually rapid and easy. For this reason, and on account of the smaller size of the uterine contents, the variations in blood pressure, if Fellner's observations are to be relied on, are less than in labour at term.

Although interruption of pregnancy is thus a legitimate treatment in advanced heart disease, the cases in which it will be found necessary will be relatively few. The operation should be undertaken only for definite indications. What, then, are these indications? (1) Where acute symptoms manifest themselves (compensatory disturbances, œdema of the lungs) and, in spite of treatment, persist or increase, labour should be induced. (2) In mitral lesions where there is evidence of auricular paralysis (Mackenzie). (3) When the pulse rate is found to be markedly increased on assuming the erect position, Tuszkai maintains that premature labour should be considered, and, if this symptom does not disappear under treatment, should be carried out. (4) Where there is a history of dangerous, almost fatal, compensatory disturbances in a previous pregnancy, abortion or premature labour should be induced as soon as the case comes under observation (Guérard, Feis, Fellner, etc.).

The management of labour in a woman with heart disease cannot fail to be a cause of anxiety to the medical practitioner. It is at this time that the dangers are greatest, and, though

death does not often take place during the actual progress of labour, there can be little doubt that many of the complications which ultimately develop owe their origin to the circulatory disturbances associated with it. The proper management of labour is, therefore, of great importance in lessening both the immediate and ultimate risks.

In the absence of urgent symptoms the first stage should be allowed to progress without interference. The membranes should not be ruptured prematurely unless some definite indication exists (Fellner). Should urgent dyspnœa arise during the progress of dilatation, the membranes should at once be ruptured. Immediate relief usually follows, but often it is only temporary. Rupture of the membranes is especially useful when œdema of the lungs is present. In collapsed conditions of the patient it should be avoided, as it tends to aggravate the condition.

In urgent cases it has generally been recommended that dilatation should be aided, either manually or instrumentally, but Fellner is opposed to this practice on the ground that it is injurious and unnecessary. There are cases, however, in which it will be advisable to assist dilatation, more especially where the membranes have been ruptured early in the hope of relieving dyspnœa. In these circumstances dilatation should be effected manually if possible, if not, by Bossi's or some similar instrument.

When dilatation is complete, it has hitherto been the rule to at once terminate delivery by the forceps in order to prevent the injurious effects of the down-bearing pains on the heart. Fellner is opposed to this routine employment of the forceps. He found that in favourable cases the patient did well without assistance. Where delay occurs he would not advise waiting too long before using the forceps. In all cases, instrumental or not, Fellner emphasises the necessity for effecting delivery slowly, more particularly the delivery of the trunk.

Since Macdonald advised that chloroform should be given in the second stage of labour, it has been very generally used in this country. It is claimed for it that it quietens the heart's action and lessens the effect of the down-bearing pains. Although not altogether devoid of risk, its employment involves less injury to the heart, and less danger, than would result from excessive pain and down-bearing, or from artificial delivery without anæsthesia. Where necessary, then, chloroform should be administered without hesitation. Even when the subject of advanced heart disease, the pregnant woman seems to retain her immunity to the dangers of chloroform.

After the birth of the child the pulse must be carefully

watched. Collapse or œdema of the lungs may rapidly supervene; indeed, it is generally agreed that the third stage is the most critical period of the labour. Its management is therefore of unusual importance, but unfortunately there are two quite opposite views as to the principles which should be followed. Here we shall take the view that the danger lies in over-distension of the right heart and engorgement of the lungs. This danger will be lessened by uterine hæmorrhage. Free or even profuse hæmorrhage is stated to be not uncommon in cases of heart disease, but it is probable that the tendency to post-partum hæmorrhage has been exaggerated. At any rate, in fourteen cases, in which the amount was carefully estimated, Schneider met with tolerably profuse bleeding in only one, while in six the amount was under the normal. Should there be free hæmorrhage, however, no alarm need be felt. Indeed, moderate hæmorrhage should be encouraged; and some writers advise that it should be supplemented by venæsection if urgent symptoms continue. Several writers report that the cases in which there was profuse bleeding made the most satisfactory recoveries.

When disturbances of compensation threaten during labour, digitalin, ether or strychnine should be subcutaneously administered, alone or combined according to indication. Severe dyspnœa with cyanosis may often be rapidly relieved by inhalations of amyl nitrite, as recommended by Fraser Wright.

The management of the puerperium is to be conducted on general principles. It should be kept in mind that the heart only slowly recovers it equilibrium after labour, and that for some time it is liable to sudden disturbances of compensation, often without apparent cause. Even when labour has terminated without the slightest disturbance on the part of the heart, sudden death may take place in the puerperium, or œdema of the lungs develop and rapidly prove fatal. In most cases general and cardiac stimulants should be administered for the first week or more of the puerperium.

OPHTHALMOLOGY.

By J. V. PATERSON, M.A., F.R.C.S.,
Assistant Ophthalmic Surgeon to the Royal Infirmary.

Etiology of Sympathetic Ophthalmia.—At present there is a disposition in many quarters to question the truth of the view that the optic nerve with its sheaths is the path by which infection spreads from an injured eye to reach the sound eye.

Persistent failures to satisfactorily demonstrate organisms or to find evidence of serious inflammatory change in the nerve, have led many to doubt the possibility of the transmission of the disease by this path. That the disease must be due to some micro-organism (at present undiscovered or unidentified) is almost universally admitted. The old view of Berlin that the disease is really metastatic in origin is again finding strong and able supporters. Römer especially has laid stress on the possibilities of infection by an organism pathogenic for the eye but innocuous in other tissues. A recent paper by Dr Ulbrich is intended to supplement Römer's views on this point: "Experimental investigation into the action of saprophytic bacteria introduced into the eyeball," by Dr H. Ulbrich, Würzburg (*v. Graefe's Archiv f. Ophthal.*, lviii. 2). The experiments of Dr Ulbrich (on rabbits) consisted in the injection of various well-known saprophytic organisms into the anterior chamber and vitreous. Thirteen different sorts of organisms were used, including bacillus proteus mirabilis, vibrio proteus, bacillus fluorescens, bacillus acid. lact, ooidium albicans, bacillus mycoides, etc. The organisms were mixed with sterile saline solution and injected with a syringe (0.04 c.cm.). In many cases careful cultivations were made from injected eyes after enucleation.

As a rule a fairly severe inflammatory reaction followed the injection of saprophytic bacteria into the anterior chamber. The inflammatory processes thus excited showed, however, a marked tendency to healing. Only in the very severest cases was there perforation of the cornea and iris prolapse. When the injections were made into the vitreous, the reaction was rather less marked; slight local or diffuse opacity of the vitreous which might clear up or remain for a long time visible. In the severest cases the appearances eventually resembled those of pseudoglioma. Although a certain number of the injections gave negative results, Dr Ulbrich considers that all the organisms he used showed themselves capable of causing inflammatory changes in the eye. Negative results he thinks may be largely due to defective methods of inoculation.

The different sorts of organisms used gave different results as regards the type and severity of the inflammation which they caused. Some organisms seemed to have most effect when in the anterior chamber, others when introduced into the vitreous.

In order to show that his injections did not act merely as foreign bodies, Dr Ulbrich employed injections of carmine and found these gave rise to no irritation. On the other hand, when cultures of the organisms were killed and then injected, a severe reaction followed (bacillus proteus, bacillus fluorescens, bacillus indicus ruber).

With regard to the fate of the bacteria in the eye, Dr Ulbrich found that the sporeless forms, with the exception of bacillus acid lactic, appeared to die soon. The spore-forming organisms proved more resistant. Cultures showed bacillus mesentericus vulgatus on the fifth day after injection. Spores of bacillus subtilis injected into the vitreous caused a considerable reaction, and on cultivation bacilli were found as well as spores. By his experiments Dr Ulbrich claims to have shown that non-pathogenic organisms may produce inflammatory changes in the eye. This he thinks meets the main objection against the theory of Berlin, and supports Römer's view of sympathetic ophthalmia. He does not suppose that the actual saprophytic organisms with which he experimented have anything to do with sympathetic ophthalmia. The large number of saprophytic bacteria which may exist in the conjunctiva is well known, but reported cases of infection with such organisms do not correspond very closely to what Dr Ulbrich observed in the rabbit, being mostly cases of acute severe inflammation. It may be, of course, that the rabbit's eye reacts differently.

Dr Ulbrich suggests that, in certain cases of irido-cyclitis, after perforating wounds the infection may be due to a saprophytic or non-pathogenic organism. He quotes a case from the clinic of Professor Hess in which bacillus subtilis appeared to be the cause of a late infection two months after a cataract extraction. A small tag of capsule in the wound is supposed to have accounted for the possibility of infection at so late a date.

In a paper in the same journal (*v. Graefe's Archiv*, lviii. 2), Professor Leber makes some weighty comments on the work of Dr Ulbrich: "Remarks on the power of certain organisms to cause inflammation in the eye and in other parts of the body, with regard to the origin of sympathetic ophthalmia." Professor Leber considers that it would be necessary for Dr Ulbrich to show definitely that the organisms he used were really absolutely innocuous in other parts of the body. The fact of these being classed as non-pathogenic does not in his opinion warrant this assumption. Leber points out, further, that large quantities of bacillus subtilis injected into the abdominal cavity will kill a guinea-pig. He also points out that even with the pathogenic organisms, *e.g.* staphyl. aureus injections made into the peritoneal cavity may be followed by no reaction. The pathogenic power of an organism is therefore a factor often difficult to determine exactly.

If experiments with saprophytic organisms are to be used to support the metastatic theory of sympathetic ophthalmia, Leber declares that the organisms should be injected into the circulation and reach the eye by the blood stream. Stock and others

have shown how remarkably different the results of such an infection may be when compared with the results of direct inoculation, the inflammatory reaction being far milder in the case of infection by the blood stream. Leber is apparently quite prepared to entertain the idea of a possible metastatic infection in sympathetic ophthalmia. He admits the non-success of all attempts to find the organism or trace its path to the other eye, and supposes it must be one which our present methods of staining and culture fail to demonstrate. He is inclined to question the view that the organism is absolutely non-pathogenic to all the tissues except these of the eye, and thinks that possibly other organs in the body may be affected but not with a severity which brings these lesions to our notice. The headache so often associated with sympathetic ophthalmia may be due, he thinks, to a chronic meningitis.

Bacteriology of the Conjunctivitis of Measles.—This is the subject of an investigation by Dr Schottelius, Freiburg (*Klin. Monatsbl. f. Augenheilk*, June, 1904). Attempts to find out whether any specific organism is to be found in the conjunctival secretion during an attack of measles have yielded negative results. In some cases of severe secondary conjunctivitis complicating measles, a bacillus allied to, or identical with, the influenza bacillus, has been identified in the secretion. The cases observed by Dr Schottelius occurred during a severe epidemic in Freiburg in 1903-04. The epidemic seems to have been one of very unusual severity, cultures having been made from no less than forty fatal cases. These are compared with cultures from forty cases which recovered. In the cases which recovered, staphylococcus aureus was found in 60 per cent., and a streptococcus in 14 per cent. In the fatal cases, streptococci were found in 50 per cent. Commenting on this paper, Professor Axenfeld, in whose laboratory the investigations were made, says that, though of course the organisms in question are not the cause of measles, still the presence of streptococci probably stands in close relation to the severity of the disease. In this epidemic a number of very severe eye complications were observed, *e.g.* two cases of severe diphtheritic conjunctivitis, one of which ended fatally, also a case of metastatic purulent iritis. Cultures from the diphtheritic cases showed large quantities of streptococci as well as diphtheria bacilli.

Choroidal Changes in Ocular Inflammations.—In a recent paper (*v. Graefe's Archiv für Ophthalmologie*), lviii. 3, p. 394,

Professor Fuchs, of Vienna, describes the pathological changes present in acute inflammation of the eye following infection from a penetrating wound. He excludes these cases where there is a slowly spreading general or nodular infiltration of the uveal tract, the type of case most apt to cause sympathetic ophthalmia. The kind of case which he describes might, he suggests, be styled "endophthalmitis septica." The infection in these cases is from the ordinary pus organisms. The question of iritis is not discussed, but attention is directed to the changes in the parts in contact with the vitreous. The inner coats of the eye, viz., retina and pars ciliaris retinæ, suffer most when the vitreous is infected. In the ciliary region the acute inflammatory process does not usually penetrate deeply the stroma of the ciliary body, being free, or nearly free, from infiltration. Infiltration of the retina is very severe, especially in its inner layers, and the inner limiting membrane is often raised and broken through by leucocytes and serous exudation. The infiltration is most marked in the anterior portion of the retina and also in the region of the optic disc. The early involvement of the optic nerve head Professor Fuchs attributes to the bacteria or their toxines being carried there early by the hyaloid canal of the vitreous. In an interesting footnote he states that possibly the early failure of light perception in some cases of vitreous infection may be due to the early involvement of the nerve, as the changes found on enucleating such an eye may be very much less than might have been supposed from the failure of vision. This would also explain how, in certain cases of this kind, the light perception improves so much when the inflammation subsides. This could not occur, of course, if gross changes such as detachment were present.

In acute infection of the vitreous detachment often occurs early, and soon becomes total. It is caused by an exudation from the retina itself, not from the choroid. The pigment layer of the retina remains lying on the choroid, and may appear practically normal. The detachment of the retina prevents infection of the choroid. If the retina remains in situ and is broken up by inflammatory deposits, the choroid is liable to direct infection.

Thus in the changes following an acute infection of the interior of the eye the choroid is seen to play quite a secondary rôle, and is not the source of the pus, as is often taught. Infiltration of the choroid is usually most marked near the ora serrata and round the disc, *i.e.* in the same situations as those in which the retinal lesions are liable to be most severe. In some cases the retina, or portions of it, with the underlying choroid, may necrose. From the region of the ciliary body the

inflammation may spread to the supra-choroidal space, and Professor Fuchs describes in detail the mode of infection and the pathological changes caused. The inflammation may be limited, or spread through the whole space. Exudatiou and formation of fibrous tissue lead to the formation of fibrous thickenings, in or upon the choroid.

Trephining the Sclera in Glaucoma.—Professor Konrad Fröhlich, Berlin, writes in favour of this procedure in certain cases. "Trephining the Sclera in painful blindness from Glaucoma," *Klin. Monatsbl. f. Augenheilkunde*, May 1904.

Professor Fröhlich thinks this operation worth a trial before resorting to enucleation in cases of painful absolute glaucoma. He quotes his experience of five cases, in four of which the operation completely relieved the pain and rendered enucleation unnecessary. This operation, recommended by Dr Argyll Robertson in certain forms of glaucoma, has never met with much favour. Some have recommended a transverse or T-shaped scleral incision as being quite as effective as the actual removal of a crown of sclera with a small trephine. Professor Fröhlich operates by first raising a conjunctival flap over the lower edge of the tendon of the external rectus. Having laid bare the sclera, he removes a 5 mm. circle with a v. Hippel's trephine, and finally brings the conjunctiva into position over the wound. The inner coats of the eye are not perforated by the trephine, usually giving way spontaneously. Five cases were successfully treated in this way. In the fifth there was persistent copious hæmorrhage from the choroid, and the operation failing to relieve symptoms, the contents of the globe had to be evacuated some days later. The operation seems one which might be used occasionally with advantage in cases where for cosmetic or sentimental reasons the patient refused to consent to the removal of a painful sightless glaucomatous eye.

Senile Macular Changes.—"On the anatomy of the senile lesion of the macula," by Dr Clemens Harms, Breslau, *Klin. Monatsbl. f. Augenheilk., Mai*, 1904. In spite of the frequent occurrence of senile macular disease very little appears to be known regarding the pathological changes present. This paper gives a detailed account of the histological changes found in an eye affected with this disease. The eye was removed from a patient æt. 77, on account of a cancerous mass involving the lids. The senile macular changes were observed with the ophthalmoscope before removal of the eye, and appear to have

been characteristic. V = fingers 1 metre. Under the microscope the rods and cones at the macular region were found degenerated and shrunken. Great thinning of the outer nuclear layer was also met with. The external limiting layer was everywhere intact. The pigment epithelium appeared loosened and irregularly raised over the macular area, but no pigment was observed to have wandered into the retina. Except in the macular region the retina showed no noteworthy changes. The choroid was somewhat thinned with sclerosed vessels and the chorio-capillaris here and there destroyed. These choroidal changes were perhaps less marked at the macula than towards the periphery and do not appear to have been very severe. Senile changes at the macula appear therefore to depend rather on retinal than on choroidal degeneration. The liability of the macula to suffer in old age while the rest of the retina remains healthy is supposed by Dr Harms to be due to the macula being more vulnerable than the rest of the retina.

Spring Catarrh. — "A contribution to the pathological anatomy of spring catarrh" by Dr F. Schieck, Göttingen (*v. Graefe's Archiv für Ophth.*, lviii. 1). After discussing the views of others, Dr Schieck gives an account of the microscopical appearances of the excised conjunctiva and tarsus in a typical case of spring catarrh. As the result of his investigations he comes to the definite opinion that the primary changes in spring catarrh are not epithelial. He found in the positions where the disease was most recent that epithelial changes had not begun while cell proliferation in the sub-epithelial connective tissue was very evident. The changes in the epithelium appeared to be only secondary, and only occurred after the cellular infiltration of the substantia propria had reached a certain intensity. A pronounced increase of the connective tissue cells and hyperplasia of the fibres was noted, causing thickening of the substantia propria. These changes were best seen over the tarsus. As soon as the sharp line between tarsus and substantia propria becomes indistinct from cellular infiltration, the elastic fibres in the tarsus appear radiating outwards towards the free surface, and contributing largely to the sub-epithelial thickening. A glassy degeneration of the newly formed elastic fibrillæ ultimately takes place, and in the developed nodules is accompanied by a diminution in the number of nuclei present. The changes in the epithelium, and in particular, the sending of processes into the deeper layers, Dr Schieck considers strictly comparable to the changes usually seen in epithelium when pressed outward by subjacent growth

teaching us much more than Dr Clouston himself taught us in this country in 1888, in his paper on "Secondary Dementia." In the chapter, again, on "States of Defective Inhibition," the author has introduced the subject, as he has been in the habit of doing in his cliniques for years past, by describing, under the name of "localised impulse," the automatic movements which are frequently met with in the insane, and which are regarded by the author as the simplest type of morbid impulse.

The main alteration in this edition, however, may be said to consist in the author's attitude towards the pathology of mental diseases, the keynote struck being that of toxæmia and bacterial infection. Though he does not give his whole-hearted support to this attractive theory—attractive, inasmuch as it holds out additional prospects of curative treatment—Dr Clouston has evidently been much influenced by these recent views of the Continental school, so ably expounded and furthered in this country by Ford Robertson and by Mott. The most striking instance of this alteration of standpoint is seen in the chapter on General Paralysis, in which syphilis and bacterial invasion appear as the most prominent etiological factors, and the account of the pathological processes has been largely recast in the light of the latest research work from the Scottish Asylums Pathological Laboratory.

A word remains to be said as to the excellence of the Pathological Plates, by which this new edition has been almost entirely re-illustrated. They consist mainly of photomicrographs and of microscopical drawings of the morbid brain changes in the insanities, and they are beautiful examples of the lithographer's art. They have been largely prepared under the advice of Dr Ford Robertson, and along with the accompanying descriptions they form quite a special feature of this edition, and greatly enhance its value as a thoroughly modern guide to the difficult study of mental diseases.

A Text-book of Legal Medicine and Toxicology. Edited by FREDERICK PATERSON, M.D., President of the New York State Commission in Lunacy, etc.; and WALTER S. HAINES, M.D., Professor of Chemistry, Pharmacy and Toxicology in Rush Medical College, Chicago. In two volumes. Vol. II., pp. 825. Illustrated. London and Philadelphia: W. B. Saunders & Co. 1904. Price per volume, 21s. net.

THE first volume of this work was reviewed in the March number of this Journal; the second deals almost entirely with the sexual

crimes and toxicology. The first section deals with malingering and simulated affections, both surgical and medical, and should prove of considerable value to army and prison surgeons. Pregnancy is next dealt with in a thorough manner, but there is nothing stated that is specially new. The important questions of legitimacy and lengthened gestation receive full attention, but in reference to the first of these the importance of the length of the menstrual cycle in individual cases is not insisted on. Super-fœtation and super-fecundation are not clearly defined; the former is considered possible in the early months of pregnancy. Infanticide is fully treated of, and the term made to include the destruction of the fœtus during birth; an opposite ruling, however, has been given in English law. The details as to the proofs of live birth are in our opinion somewhat scanty.

The subjects of impotence, sterility, rape, and venereal disease, and marriage and divorce in their medico-legal aspects, receive full attention, and there are useful chapters on Malpraxis and the legal aspects of the Röntgen rays. The concluding section of this part of the work embraces an adequate summary of the laws relating to the insane in all the states and territories of the United States.

In the portion dealing with toxicology, there is a preliminary chapter on classification, methods of analysis, treatment, and so forth. The term "spinant" as applied to poisons acting on the cord does not strike us as particularly happy or elegant. For descriptive purposes the poisons are classified in five sections, namely, inorganic, alkaloidal, non-alkaloidal organic, gaseous, and those due to altered foods. The treatment of each poison is in every way thorough, and the methods of isolation and detection are specially well described. We find no mention under copper of chronic poisoning as it occurs in brass-workers, and nutmeg is omitted from the vegetable poisons. A chapter of great value to the expert deals with the effect of ptomaines and bacterial products in masking the reactions of organic poisons in the dead body.

There are adequate sections on the examination of blood and seminal stains, but no special mention is made of marks due to rust or fruit juices. The various hairs and textile fibres which may be found on weapons are described, but no account is given of the starch grains. The concluding chapter deals with the responsibility of pharmacists and dispensing chemists. Throughout this volume, as in the first, a high degree of excellence is maintained, and the work must prove a valuable addition to the literature of medical jurisprudence and toxicology.

The Therapeutics of Mineral Springs and Climates. By I. BURNEY YEO, M.D., F.R.C.P. Pp. 751. London: Cassell & Co. 1904.

THE author divides his book into two parts: in the first he deals with mineral springs, and in the second with climate and climatic resorts.

The tendency of many authors of works on mineral waters is to be somewhat confusing in their classification of them, and Dr Burney Yeo is considerate enough to adhere to a more simple though not original table.

He divides the waters into the following groups:—

1. Simple or "indifferent" thermal waters.
2. Common salt waters.
3. Alkaline waters.
4. Bitter waters.
5. Iron or chalybeate waters.
6. Earthy or calcareous waters.
7. Sulphur waters.
8. Arsenical waters.

In an exhaustive survey of the principal mineral springs, he treats of them by alphabetical arrangement, and goes very fully into the many and varied procedures connected with hydrotherapy.

The description of spas is on the whole excellent, but naturally with so much ground covered, will not meet with universal approbation, and, more especially in the case of resorts on the south side of the Lake of Geneva, in the valley of the Rhine, and the higher mountain valleys of Switzerland, will divergence of opinion exist.

The description of European mountain resorts forms, however, one of the most ably treated sections of the book. Of distant mountain resorts, among others many in the American Rockies are noted. But why not Banff and others in the Canadian Rockies? And, when notice is taken of springs and resorts in every quarter of the globe, how is it we find no reference whatever to the many important waters and springs of Japan?

Consideration of the Riviera naturally occupies an important place in the book, and, before concluding, Dr Burney Yeo deals with the subject of consumptive sanatorium treatment, and gives a list of home and foreign sanatoriums.

The Treatment of Plague with Prof. Lustig's Serum. By N. H. CHOKSY. Pp. 166. Bombay: "Eagle" Printing Office.

THERE seems to be a considerable difference of opinion in India as to the value of the serum treatment of plague, and some criticism seems to have been passed on Dr Choksy's treatment of cases in the Arthur Road and Maratha Plague Hospitals. This book is therefore to some extent a vindication of the use of Lustig's serum, and consists of various collected papers on the subject and elaborate statistics of cases treated in hospital and in private practice with and without the use of serum. We are bound to confess that Dr Choksy makes out an exceedingly strong case for the use of the serum, and it is a matter of deep regret that the Bombay Government by withdrawing its subsidy compelled the closing of the station for its manufacture. The method for testing the value of the treatment consisted in treating alternate cases with and without the serum from the time of their admission to hospital, no selection of cases being made. In a series of 480 consecutive cases of each class it was found that the serum-treated cases showed a death-rate of 11 per cent. less than those treated by ordinary methods. It has been urged that this is a small reduction in a rate which is normally over 70 per cent., but, as Dr Choksy points out, for the first four years in which diphtheria antitoxin, an admitted success, was used, the reduction in the death-rate per cent. was only twelve. Unfortunately, however, the serum has so far been found useless in septicæmic cases, and when this type occurs frequently the general death-rate is not likely to show a striking improvement. Dr Choksy publishes a series of interesting charts from cases treated in private practice. He uses large doses, 100 c.c. repeated daily or even oftener in some cases. One of his charts records 970 c.c. given in six days to a patient who recovered. He also urges the necessity of getting the patient under treatment early. It is to be hoped he will be able to resume the treatment if the plague persists.

The Infectivity of Enteric Fever. By ALEXANDER COLLIE, M.D. Pp. 47. Bristol: John Wright & Co.

DR COLLIE in this pamphlet reminds us that too much stress may be laid on infection by water in epidemics of typhoid. He believes the disease to be directly infectious to those brought in close contact with it, and instances the well-known liability of

nurses to contract the fever. We thought that this was generally admitted, it being understood that the hands of the nurse or attendant are liable to become infected, or that, on the other hand, infection can be inhaled with dust from small fæcal stains which may have dried on the bedclothes. These would appear the only ways in which bacillary infection could be communicated to the attendant. It is not easy to make comparisons with typhus, as so far we are ignorant of the cause of that fever, though it would appear that the infection is contracted by inhaling exhalations from the patient. That this might be the case in enteric we are not prepared to deny, though the methods of infection suggested above seem more probable. We gather from Dr Collie's pamphlet that he does not altogether deny water-borne infection, but we are inclined to think that he underrates its frequency and importance. Nevertheless his destructive criticism of Dr Buchanan's classical report on the Fig Tree Court epidemic at Caius College, Cambridge, makes most interesting reading, and he presents a strong case for the view of infection from person to person. On page 33 are given some most interesting examples of such infection. Dr Collie's great experience of fever work compels us to consider very carefully what he says, and it is perhaps as well that this method of infection should be brought so forcibly to our notice.

An Index of Symptoms as a Clue to Diagnosis. By RALPH WINNINGTON LEFTWICH, M.D. Third edition. Pp. 400. London: Smith, Elder & Co. 1904.

THE most remakable thing about this book is the fact that it has reached a third edition. From beginning to end of 400 pages, filled with long tables of symptoms, it is difficult to discover any useful practical memoranda, and consequently difficult to imagine what class of medical man would care to spend time in perusing it.

In his preface the author says "A student, in consulting this little work, should have at hand a Dictionary of Medicine, and for this purpose none is better than Quain's"! At last, happily, a use has been found for "Quain's Dictionary of Medicine"!

It is interesting also to learn that if the physician's "mind's eye" be sufficiently developed he will be enabled to divide his patients into 4 groups; (1) the pessimistic, "usually either hysterical or liverish"; (2) the optimistic; (3) the complaisant, or Irish; and (4) the mendacious or poorer hospital patients.

At one place we have tabulated 60 hereditary diseases, among them acne, apoplexy, diabetes, heart disease, progressive muscular atrophy, tumours, tuberculosis; at another we have a list of 87 diseases causing general dyspnœa; and in a third we are told that the centrifuge is to be mistrusted as "almost misleadingly sensitive" in the examination of urinary deposits.

A Manual of Ambulance. By J. Scott Riddell, M.A., M.B., and C.M., Senior Surgeon and Lecturer on Clinical Surgery, Aberdeen Royal Infirmary. Fifth edition, revised and enlarged and fully illustrated. Pp. 227. London: Chas. Giffen & Company, Limited. 1904. Price 4s.

The appearance of a fifth edition shows the popularity of Dr Scott Riddell's Manual of Ambulance.

Chapter I., dealing with the outlines of human anatomy and physiology, is concise, brief, and gives a comprehensive synopsis of the subject in an intelligible way.

In the chapter on bandaging, fig. 42 is not the recognised method of applying a narrow arm sling; otherwise the illustrations are accurate and the description full.

The chapters on fractures, dislocations, hæmorrhage and wounds are good, and will appeal especially to military ambulance pupils.

The chapters on suffocation and poisoning are very readable and contain much useful information well arranged.

A most useful and new departure is well written under the heading, Accidents from Electricity.

The chapter on transport is well illustrated, and gives a full and accurate account of the various recognised methods of moving injured and helpless patients, and is specially worthy of careful perusal by Volunteer and ambulance pupils.

Altogether, the Manual of Ambulance can be confidently recommended as a class-book to those interested in teaching and practising ambulance work.

Transactions of the College of Physicians. Third Series, Vol. 25. Philadelphia, 1903.

The first point which forces itself on one's attention on reading through this volume is the great preponderance of papers on

nervous disorders. The first of these, by Dr W. G. Spiller, deals with tumours of the spinal cord, or spinal column. After carefully describing an interesting case of intradural spinal cyst, with operation and recovery, the author gives reports of eleven other cases which have come under his observation, and after discussing the effects of operation, concludes with the very guarded statement that "operation should be attempted in every case of spinal tumour which seems suitable." Of his own cases, in only two was operation advisable. The same author, along with Dr Charles H. Frazier, contributes a lengthy paper on tumours of the brain. Five cases are cited, in all of which operation was undertaken by Dr Frazier. A remarkable condition in one case of unilateral cerebral lesion was complete paralysis of one side of the thorax, the lung being entirely atelectatic. Dr Frazier discusses the operative procedure, and in his resumé upholds the necessity for (*a*) the avoidance of prolonged operation, (*b*) the prevention of excessive hæmorrhage, and (*c*) the avoidance of unnecessarily rough manipulation of the brain substance.

Dr Weir Mitchell has a short contribution dealing with the relation of neuralgic headaches to storms, and there is also an interesting paper on "Tortuosity of the Aorta," illustrated by several X-ray photographs.

Clinical Studies in Syphilis. By ARTHUR H. WARD, F.R.C.S., Surgeon to the London Lock Hospital. Pp. 156. London: The Medical Times, Ltd. 1904.

THE title of this little book is somewhat misleading, as in reality, within the short compass of 156 pages, it deals with the whole subject of syphilis, ætiology, diagnosis and treatment.

As a consequence, the information to be found in it on any particular point is not very extensive. The author, however, has produced a book which sets forth the main facts concerning syphilis in a lucid and forcible manner, and, as such, we can cordially recommend it to the student of medicine who cannot afford the time to digest a larger work, but who, on the other hand, does not desire to employ a "cram."

The author, as he goes along, touches on many of the still unsolved problems of syphilis, and his remarks in regard to these are always suggestive and often original. In this connection we may cite his ingenious elaboration of his "microbe-toxin theory" which crops up all through the "studies."

Mr Ward is a strong upholder of the oral method of

administering mercury. We think, however, that the utility of the book would have been greatly increased if, even at second hand, more information had been given upon the practical carrying out of other methods, such as inunction, so largely practised, at anyrate upon the Continent.

A Manual of Surgical Diagnosis. By JAMES BERRY, B.S., F.R.C.S., Surgeon to and Lecturer on Surgery at the Royal Free Hospital, etc. London: J. & A. Churchill, 7 Great Marlborough Street. 1904. Price 6s.

THIS little volume is intended for the use of students working in hospital as clerks or dressers. It does not attempt to cover the whole ground of surgical diagnosis, but contents itself with the elementary principles and methods involved in the examination and diagnosis of a surgical condition. The first or introductory part contains a general survey of case-taking and physical examination, with short references to clinical methods, such as examination of the urine, blood, etc., which the student would be expected to carry out in the case to which he is attached. The second part deals with the more important features that characterise the commoner forms of surgical diseases, especially with those that are of importance in differential diagnosis. The third part is devoted in like manner to the more usual forms of injury.

For practical purposes the work may be looked upon as an introduction to surgical diagnosis, and as such it possesses considerable merit. Its clearness and brevity are attractive features, and second year students should find it of much service to them in their clinical work in the surgical wards.

Philadelphia Hospital Reports. Vol. v. 1902. Edited by HERMAN B. ALLYN, M.D. Pp. xii. + 178. Philadelphia: Maurice H. Power. 1903.

THIS volume of Reports, which has just reached us, contains, besides a number of articles of general medical and surgical interest, papers on the new pavilions for phthisis in the hospital, on the history of the establishment of the nervous and orthopedic cliniques, on the organisation of the dental department,

and on the training of nurses. The remaining twenty-nine papers (most of them commendably brief) are for the greater part concise descriptions of the more striking cases which have occurred in the hospital during the year. As is fitting in the land of "biggest" things, Dr Curtin describes the largest recorded aneurism of the heart, which weighed 2850 grains and had a capacity of nearly 1500 c.c. One of the most elaborate papers is that of Dana on amyotrophic sclerosis; the writer dissents from the view of Leyden and Gowers that no distinction need be drawn between this disease and progressive muscular atrophy. Dercum reports a case of general sarcomatosis, Eshner a fatal case of polyarthritis, Riesman a case of gangrene of the lung in which radiography aided in localising the lesion. An interesting paper is that by Pearce on the "epiphenomena" of cerebral hæmorrhage, in which sundry minor or secondary symptoms, both of the disease itself and of the apoplectic habit, too little emphasised in the text-books, are discussed and their meaning indicated. Kernig's sign forms the subject of three articles—one by Sailer, on its unilateral occurrence in focal brain disease; another by Shields, who in examining 100 non-meningitic cases for this sign, found it in three cases of typhoid and two of hemiplegia; while Clark reports one case of cerebro-spinal and two of tuberculous meningitis in which the sign could not be elicited. A number of other papers, including several on diseases of the eye, go to make up a volume in which so uniform a standard of excellence is maintained that it would be invidious to make further selection.

Martin's Up-to-Date Tables, for use throughout the Empire, Weights, Measures, Coinage. By ALFRED J. MARTIN, F.S.I. Pp. 247. London: T. Fisher Unwin. Price 2s. 6d.

THIS is one of those books which give the purchaser a good deal more than he has a right to expect from the title-page. Not only are we provided with tables of weights, measures, and coinage, but a great deal of very valuable information is thrown in. We have, for instance, a summary of Imperial, of Colonial, and of Indian Acts of Parliament on weights and measures and coinage, rules of mensuration, measures of temperature, power, heat, pressure, electricity and gas, paper quantities, sizes and folds, and—not to mention everything—several useful maps.

Perhaps the most interesting part of the book—and the author has somehow contrived to make a book of tables interesting—is the discussion of the Metric System, of which Mr Martin is a strong advocate, maintaining that if the Metric System were made compulsory for railway companies, were adopted by the Bank of England, and shown on our Ordnance Surveys, within a very short time it would be generally adopted throughout the empire. The difficulties in the way of such a consummation are not nearly so great as is often imagined. What these are and how they are to be overcome must be studied in the book itself, which we recommend to all who have use for a work of the kind.

A Text-Book of Clinical Anatomy, for Students and Practitioners. By DANIEL N. EISENDRATH, A.B., M.D., Professor of Clinical Anatomy in the University of Illinois, etc. Philadelphia, New York, London: W. B. Saunders & Co. 1904.

THIS is a handsome volume, artistically illustrated. It comprises 500 pages, of which three-fifths are occupied by diagrams, for the most part full-page. The text in consequence is short, and, from the point of view of surgical anatomy, is not sufficiently comprehensive in range and detail to be satisfying. Strictly speaking, the term clinical anatomy does not cover all the ground of surgical anatomy; we cannot but feel, however, that had the latter been dealt with more fully, the value of the work would have been added to. The illustrations undoubtedly form the feature of the book, though we think the term "beautifully illustrated" is more fitted for the publishers' circular than for title-page. They are mostly original, and those representing the topography of the viscera are reproductions of photographs taken from an ordinary artist's model, on whom the organs were mapped out. The outlines of the latter are drawn with admirable clearness, but the surface of the abdomen is flat, and the superficial landmarks formed by the rectus muscle, infracostal margin, and Poupart's ligament are indefinite.

Apart from the incompleteness of the text as regards its bearing on surgical anatomy, the work is deserving of great praise in that it enables the student to apply his dissecting-room knowledge of anatomy to a clinical use.

Vaginal Tumours, with Special Reference to Cancer and Sarcoma. By W. ROGER WILLIAMS, F.R.C.S. Pp. 92, with five illustrations. London: John Bale, Sons, & Danielsson. 1904.

THIS is a thoroughly complete and also concise work upon all the varieties of vaginal neoplasm. The author has collected together much valuable information and condensed it into less than a hundred pages. Gynecologists are indebted to him for the trouble he has taken, and will find his work of great use for reference. More than 250 authors are quoted.

Golden Rules of Anæsthesia. By R. J. PROBYN-WILLIAMS, M.D., Senior Anæsthetist at London Hospital, etc. Bristol: Wright & Co.

THIS is the latest of the well known Golden Rules Series. It is an excellent and thoroughly practical little guide to the administration of anæsthetics, written by an anæsthetist of large experience. The instructions are compact, tersely expressed, and up to date. Nothing of importance is omitted, and the numerous practical hints, based on the author's wide personal experience, are well worth professional consideration.

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THE SCOTTISH
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AN INTRODUCTION TO MODERN THEORIES OF IMMUNITY[1]

By D. A. WELSH, M.A., M.D., F.R.C.P. (Edin.),
Professor of Pathology, University of Sydney

PART I.—EHRLICH'S THEORY OF TOXINS AND ANTITOXINS.

IN the development of any science there comes a time when a good working hypothesis is of more value than a multitude of fresh facts, and, but a few years ago, bacteriology began to experience this need. It had made unexampled progress as a descriptive science. It had been of inestimable service to mankind in determining the actual agents of most infective diseases, and in thus indicating means of prevention. It had accumulated a somewhat chaotic mass of facts regarding the production of immunity, but further advance in this direction was particularly hampered for lack of an illuminating theory. Ehrlich, however, supplied the deficiency, and explained the phenomena of immunisation by reference to inter-molecular reactions. The development of his theory constitutes one of

[1] Part of this paper formed the substance of an address to the Medical Society of the University of Sydney, and it has been published in its present form in the hope that it may be of service to those who are interested in recent developments of pathology, but have not leisure for wider reading. I have endeavoured to present the subject as free as possible from technicalities of expressions, and to avoid that *bizarre* terminology which only too successfully bewilders and repels the unaccustomed reader. In so doing I am only following the excellent example of Ehrlich, whose Croonian Lecture on Immunity, done into English by Bashford, is a model of ucid exposition and simple language. To this lecture, and to a recent review of current theories by Ritchie in the *Journal of Hygiene*, I am very materially indebted. The paper has already been published in the *Australasian Medical Gazette*.

the most logical and masterly contributions ever made to pathology. It offers a consistent explanation of nearly all the most important facts; it has proved fertile in suggesting fresh discoveries, and it contains the promise of more.

1. *Relation of toxin to antitoxin.*—Ehrlich was led at an early stage of his work on toxins to conclude that the interaction of toxin and antitoxin is of a chemical nature, and this conception of the relation of toxin to antitoxin is fundamental to his whole theory. When brought into contact outside the body, the two substances appear to combine, so that the mixture is harmless on subsequent injection. Ehrlich noted that the reactions of toxin and antitoxin are subject to the general laws of physical chemistry—that the process is accelerated by warmth and retarded by cold, that it proceeds more rapidly in concentrated than in dilute solution. Hence he inferred that antitoxin neutralises toxin much in the way that an alkali neutralises an acid. The opponents of this theory maintain that there is no such interaction, that the process is purely physiological, and that, when toxin and antitoxin are present together in the animal body, the latter stimulates the tissues to resist the toxin. The evidence once quoted in support of this physiological relationship is now largely discredited, while on the contrary all the facts are in favour of the chemical view.

Important corroboration was afforded by the work of Martin and Cherry on snake venom, which resembles bacterial toxin in developing an antitoxin on injection. They compared the behaviour of toxin with that of antitoxin when filtered under pressure through gelatine, and found that toxin molecules could readily pass, while antitoxin molecules could not. Hence from a mixture of toxin and antitoxin it was thus possible to separate any free toxin that might be present. By filtering such mixtures at different intervals it was found that the longer the toxin remained in contact with antitoxin the less free toxin was obtained in the filtrate, until after a certain time no toxin appeared, and the fluid left behind was innocuous, the inference being that a complete chemical union had occurred between toxin and antitoxin, and that time was an important factor as in other chemical processes. Incidentally these experiments also show that the molecule of antitoxin is larger than that of

toxin, and probably, therefore, that the antitoxin is not a derivative or modification of the toxin molecule.

Ehrlich supports his view by reference to the action of ricin, which has the property of disintegrating red blood cells. Repeated administration of suitable doses, however, confers immunity, and in the blood serum of the immune animal there appears an anti-body (anti-ricin) which counteracts the toxic effect of ricin, and thus corresponds to an antitoxin. Now both the disintegrating effect of the ricin and the protective action of the anti-ricin can be demonstrated in test tubes containing susceptible blood corpuscles, as well as in the animal body. Hence it is not possible to assume a purely physiological reaction between ricin and anti-ricin.

Again, Morgenroth has shown that, if the milk-curdling ferment, rennin, be injected after the manner of an immunisation experiment, the serum of the animal acquires the power of protecting milk against the action of the rennin, that is, an anti-rennin is produced. Obviously, milk is a substance incapable of physiological reaction, and it is hard to explain the antagonism of rennin and anti-rennin except on the basis of a chemical union. In all probability, therefore, the reaction between such analogous bodies as toxins and antitoxins also depends on chemical rather than on physiological processes, and that is the first step in Ehrlich's theory.

But, if toxin and antitoxin combine after the manner of, say, an acid and an alkali, that is, subject to certain principles of physical chemistry, the interaction must be governed by the other general laws which govern all chemical processes. In particular, they must react with one another in definite equivalent quantities, just as a fixed and definite quantity of a given alkali will combine with a fixed and definite quantity of a given acid. Now a most interesting obstacle arose. This fundamental principle of chemical action appeared not to hold in the case of toxin and antitoxin.

You may ask how it is possible to make exact numerical determinations of such elusive substances, since neither toxin nor antitoxin are known in pure condition. Yet it is possible to attain remarkably exact measurements, particularly in the case of diphtheria. The toxin is measured simply in terms of its toxicity—the unit of toxic action, or the "minimum lethal

dose," being that amount which exactly suffices to kill a given animal of given weight within a given time, *e.g.*, a guinea-pig weighing 250 grammes in the course of four days. Similarly, the strength of an antitoxin is measured in terms of its capacity for neutralising toxin, the antitoxic unit, or, as it is called, the "immunity unit," being that amount of the serum of an immunised animal which will exactly neutralise 100 M.L.D. of toxin, so that when toxin and antitoxin are mixed outside the body and allowed to stand for half an hour, inoculation of a guinea-pig with the mixture will produce no symptoms.

When Ehrlich came to test the toxicity of different samples of diphtheria toxin by means of the immunity unit, determined for one particular toxin, he was met by the unexpected result that of one toxin perhaps 20, of a second perhaps 50, and of yet a third perhaps 130 minimal lethal doses were saturated by one immunity unit. Remember that one immunity unit ought to satisfy the affinities of exactly 100 M.L.D. Hence, at first sight, it appeared that toxin was not neutralised by antitoxin in equivalent proportions. But this apparent contradiction of the chemical theory became explained when the same sample of toxin at different periods of time was compared with an antitoxin of constant potency. It was found that one immunity unit exactly neutralised, say, $x$cc. of toxin when freshly prepared, and that this quantity represented 100 M.L.D. But, when the same toxin was tested after a considerable time, the remarkable fact was discovered that exactly $x$cc. of the toxin were again neutralised by one immunity unit, but that this quantity now represented only, say, 50 M.L.D. Hence the older toxin had lost much of its virulence but none of its combining affinity with antitoxin. It had long been known that the toxin was an unstable body which tended to lose its toxic properties on being kept; but the further fact that it might still require the same amount of antitoxin for complete neutralisation had not previously been observed.

Now, from a chemical standpoint, this apparent discrepancy was easily explained by assuming that in the complete toxin molecule there are two chemical affinities, such as occur in many bodies known to organic chemistry, and that the one can combine with a corresponding affinity in the antitoxin molecule, while the other can exert a poisonous action on the

tissues. For convenience, Ehrlich designates the combining group "haptophorous," and the toxic group "toxophorous." The instability of the toxin on being kept is therefore due to the unstable character of the toxophore group, and the constancy of its combining capacity for antitoxin is due to the greater relative stability of the haptophore group.

In any crude toxin there are entire toxin molecules in which both affinities are preserved, and degenerate toxin molecules in which the purely toxic affinity has been lost while the combining affinity is retained. For such degenerate molecules the term "toxoid" was introduced by Ehrlich, and the changes in constitution of a crude toxin, through lapse of time or otherwise, might be represented by saying that the true toxin molecules progressively decreased in number while the toxoids correspondingly increased.

To sum up, then, the chemical view of the interaction between toxin and antitoxin has led to the further theory that in the ultimate toxin molecule there are two chemical affinities, one atom group being capable of saturation by antitoxin, while the other atom group is capable of toxic action. Let us next consider how far this theory is borne out by other facts, and in particular what explanation it can offer of the nature of toxic action on the tissues, and of the origin of antitoxins themselves.

2. *Relation of toxin to tissue.*—We have now to consider the series of experiments quoted by Ehrlich in illustration of the nature of the action exerted by toxins upon tissues, and then to discuss the bearings on his theory, of the facts ascertained, noting in particular to what extent his hypothesis is consistent with, or reinforced by, the experimental data.

(*a*) If a suitable dose of tetanus toxin be injected into the vein of a rabbit, then no immediate result appears. An appreciable and often considerable time, many hours for example, may elapse between the introduction of the toxin and the onset of toxic symptoms. But, once the characteristic spasms appear, they gradually increase in violence until they end in death. This further fact is of importance, that the toxic symptoms can be shown to be due to the selective action of the toxin upon the central nervous system, and the consequent derangement of certain nerve cells.

(*b*) If a rabbit receives into its circulation a minimum lethal

dose of tetanus toxin, and as soon as possible thereafter has all its blood replaced by transfusion, it will nevertheless succumb to tetanus just as if no transfusion had occurred (Heymans). Therefore, in the brief interval of time occupied by the transfusion, the whole of the minimum lethal dose had escaped from the blood stream into the tissues.

(*c*) If a rabbit receive a moderate dose of tetanus toxin, say 12 M.L.D., and immediately thereafter the equivalent neutralising dose of antitoxin, then no symptoms result, the explanation being that the antitoxin is still able to saturate the affinities of the toxin before it has reached the tissues. When, however, the exact neutralising dose of antitoxin is introduced not immediately, but seven or eight minutes after the injection of the toxin, then death occurs from tetanus just as if no antitoxin had been given (Dönitz). Hence, within these few minutes, a dose of toxin equivalent to at least one minimum lethal dose must have passed out of the vessels and become fixed in the tissues.

(*d*) Further experiments showed that although the toxin had passed out of the blood stream, it could still be neutralised by antitoxin, provided that the quantities of antitoxin introduced were larger than the exact neutralising dose, but that, the longer the interval that elapsed between the injection of toxin and of antitoxin, the greater was the amount of antitoxin required to prevent death, so that many thousand times the exact neutralising dose of antitoxin might have to be given. Further, after a certain lapse of time, varying to some extent with different animals, and depending also on the initial dose of toxin, but in certain circumstances not exceeding half an hour, no amount of antitoxin was able to neutralise the fatal effects of the toxin. In particular, if tetanic symptoms had set in, however slightly, before antitoxin was given, then only a very small proportion, of animals could be saved by the most powerful antitoxin, even in enormous doses.

I may parenthetically remark that in these facts we have an explanation of the frequent failure of antitoxin to avert death in cases of tetanus in man, since many hours often elapse after the onset of symptoms before antitetanic treatment can be undertaken. We have the further indication for treatment that relatively enormous doses of antitoxin are required

and that the first should be injected without the loss of a single minute. It is essential to remember that there is this important distinction between diphtheria and tetanus—the two diseases in which the action of the toxin predominates, and in which, therefore, antitoxic treatment should be most beneficial —that the presence of diphtheria bacilli is evidenced by a local lesion in the fauces usually of a characteristic form, and that the bacilli may thus be identified by bacteriological means before the graver symptoms of the malady have set in, whereas in tetanus the local effects of the bacilli are almost insignificant, and the site of inoculation therefore presents no appreciable difference from an ordinary septic wound or slight abrasion. Hence it is exceedingly seldom that there is any indication of the presence of tetanus bacilli until tetanic symptoms actually set in, when it is not only unnecessary but highly disastrous to wait for a bacteriological report. These are practical details of the utmost importance, but we must now return to the discussion of the scientific principles that underlie the facts already noted.

When tetanus toxin is injected into the circulation it becomes within a few minutes anchored to certain cells of the central nervous system, but does not for several hours begin to exert any toxic effect. On the theory that the toxic molecule possesses two independent chemical affinities, this is easily explained by saying that the combining affinity of the toxin molecules has met a corresponding affinity in molecules of the cell protoplasm, and has been saturated by it, just as it would be saturated by the antitoxin molecule, but that the toxophorous affinity does not so readily enter into chemical union with suitable atom groups of molecules of the cell protoplasm, and only later begins to exert its poisonous action and to disturb metabolism.

In support of this application of Ehrlich's theory we must recall the fact that we have seen strong evidence of a chemical union between toxin (by its haptophore atom group) and antitoxin, and that when the exact neutralising dose of antitoxin is injected, say ten minutes after the toxin, it is not possible to dislodge the toxin molecules from their union with the tissue elements; in other words, the chemical affinity which we know to exist between toxin and antitoxin has been

resisted by an affinity at least as powerful between toxin and tissue, and presumably, therefore, both are chemical. This explanation is quite consistent with the further fact that, when not the exact neutralising dose of antitoxin but an enormously greater amount is administered, it is possible, within certain limits of time and in certain conditions, to dissociate the bulk of the molecules of toxin from those of the cell protoplasm. When relatively few toxin molecules in combination with tissue molecules are brought into contact with a relatively great number of antitoxin molecules, then, even if the chemical affinity of toxin for tissue molecule is slightly greater than that of toxin for antitoxin, nevertheless what is known as the mass action of the multitude of antitoxin molecules would result in the transference of toxin molecules from tissue to antitoxin, and in presence of sufficient excess of antitoxin so much toxin might be thus transferred that less than the minimum lethal dose would be left in chemical union with the tissues, and recovery would become possible.

Take an example from organic chemistry (Ritchie). Hæmoglobin has a greater affinity for carbon monoxide than it has for oxygen; in other words the compound CO-hæmoglobin is more stable than the compound oxy-hæmoglobin; but, if a small quantity of CO-hæmoglobin be brought into contact with a large excess of oxygen, then a considerable proportion of oxy-hæmoglobin may be formed. Now for "hæmoglobin" read "toxin," for "carbon monoxide" read "tissue," for "oxygen" read "antitoxin," and you have the argument in a nutshell. Indeed, it affords additional proof that the union between toxin and tissue is of a chemical nature, since the power of dissevering toxin from the central nervous system is possessed only by the specific antitoxin. The conclusion is inevitable that, if the union between toxin and tissue can be overcome only by means of a specific chemically antagonising agent, then it must itself depend upon a chemical interaction (Ehrlich).

Next consider the selective action of toxin on the tissues and its distribution in the body. Here again, for sake of precision, let us confine our attention to tetanus. It has long been known that the violent muscular spasms of tetanus are due to toxic interference with the metabolism of certain cells of the central

nervous system. But it is a condition of toxic action that the toxin molecule should become fixed to protoplasmic molecules of susceptible cells, and, if this be translated into our present terminology, it simply runs that certain nerve cells possess atom groups resembling those of antitoxin in having a chemical affinity for the combining (haptophorous) atom group of tetanus toxin. But this is not the whole truth. There is evidence that such toxophile atom groups exist in cells other than those of the central nervous system. In the guinea-pig the same dose of tetanus toxin is fatal whether it is injected directly into the brain or into the subcutaneous tissues, whereas in the rabbit the lethal dose is twenty times greater when administered subcutaneously than when injected into the brain (Roux). This can be explained only by saying that in the guinea-pig the tetanophile atom groups are essentially confined to the central nervous system, whereas in the rabbit they are present in other organs also, so that, when the toxin is injected directly into the brain, the toxophile atom groups there present at once seize on all the toxin, and the whole dose, therefore, becomes effective, while, when toxin is conveyed through the lymph and blood streams, the toxophile groups in other tissues take up the toxin in equivalent proportions, so that, as a matter of fact, only one-twentieth part becomes effective. It had previously been noted that, when nearly neutral mixtures of toxin and antitoxin are given to the rabbit, death occasionally results not from tetanus but from a peculiar form of wasting, which has been designated "tetanus sine tetano" (Dönitz). Even in animals like the alligator and the domestic fowl, which are naturally quite immune to tetanus, there is evidence that tetanus toxin on injection becomes fixed in the tissues, presumably not in the central nervous system (Metchnikoff). We must, therefore, conclude that, although tetanus toxin may, and in some animals does, unite by its haptophorous affinity with molecules of many different cells in the body, yet it is only in certain cells, except in very exceptional circumstances only in cells of the central nervous system, that the toxophorous affinities are able so to derange metabolic processes as to produce lethal effects.

Ehrlich draws attention to the different forms of cell metabolism, and to differences in the behaviour of molecules of cell protoplasm to molecules of extraneous matter. Certain sub-

stances, particularly food stuffs, are able to enter into intimate chemical union with protoplasm, and by a process of synthesis to become incorporated into its molecular constitution, so that it becomes impossible to sever the combination or to recover the food stuff from the protoplasm by any process of extraction by indifferent solvents, whereas other substances, notably alkaloids and pharmacological agents generally, though they are still able to exert a powerfully toxic action on metabolism, have not the capacity of intimate chemical union with the cell protoplasm, of which, therefore, they never come to form an integral part, and from which they may with comparative ease be dissociated by simple extraction, as by alcohol, acetone, and other reagents, or even by mere mechanical shaking. Ehrlich, therefore, assumes that such bodies as alkaloids do not possess chemical affinities capable of saturation by corresponding affinities in tissue molecules, and with this disability he correlates the fact that they are unable to produce specific anti-bodies on injection—anti-strychnine, for example, being unknown. Hence he concludes that only certain substances, food-stuffs in particular, can enter into chemical union with the tissues in the sense previously defined, and for this purpose the tissue molecules must be furnished with certain atom groups whose function is to combine with the corresponding atom groups of food-stuffs essential to tissue nutrition.

Now we must disabuse our minds of too rigid a conception of the cell. We must not regard it solely as a morphological unit with certain intricate details of structure, but we must regard it from the chemical standpoint, and recognise that its protoplasm has a most complex molecular constitution. Ehrlich suggests that cell protoplasm, for example, consists of a central disposition of molecules, and that each tissue molecule is equipped with nutritive side chains (atom groups), which possess a certain degree of independence, and which differ from one another according to the requirements of different tissues. Since these side chains, or atom groups, of tissue molecules are specially designed to combine with or receive the corresponding atom groups of food-stuffs, they may fittingly be termed "receptors"; in other words, the tissue molecules possess receptors for molecules of food-stuffs.

Now, though we know very little of the chemical constitution of toxins, all that we do know points to their being closely related to proteids, standing, therefore, not far removed from a most important group of food-stuffs. It would not be surprising then, as Ehrlich remarks, that they should possess a combining atom group corresponding to that of a food-stuff. To make a long story short, the next step in the theory is that the haptophore (combining) atom groups of the toxins have a special affinity, not only for antitoxins, but for certain receptors (side chains) of the cell protoplasm, which normally are concerned with fixing molecules of food-stuffs. Remember that alongside this combining (haptophore) atom group, which fixes them to the cell protoplasm, the toxins possess also a second group, which, in regard to the cell, is not only useless but injurious—the toxophore atom group.

You may say it is all very well to build up a theory in this way; but how are we to put this wild hypothesis to the test of fact? Let us suggest a crucial test. You remember that, in estimating the efficacy of antitoxin, we spoke of mixing the toxin and the antitoxin in suitable proportions, allowing the mixture to stand for a short time, and then injecting the mixture into an animal. If no result followed, we inferred that the toxin had been completely neutralised by the antitoxin, and this we explained by saying that the combining (haptophorous) affinity had been saturated by the corresponding affinity in the antitoxin, so that the toxin was unable to become fixed to the tissue cells, and thus to become effectively toxic. But now we have gone on to say that certain tissue molecules possess receptors (atom groups) which resemble the atom groups of antitoxin molecules in having a maximum chemical affinity for toxin. If this be so, then these tissue molecules should be able, when mixed with toxin outside the body, to saturate the combining affinity of the toxin so that the mixture on injection should be perfectly harmless; in other words, if the tissue molecules have the same affinity for toxin molecules that antitoxin has, then they should be capable, equally with antitoxin, of neutralising toxin outside the body. Take the case of tetanus again. We have seen evidence that in the guinea-pig, tetanus toxin is fixed entirely in the brain, and not at all in the other tissues

of its body. Hence, if the theory is correct, a mixture of tetanus toxin and guinea-pig brain should be as harmless as a mixture of tetanus toxin and antitoxin, and a mixture of any other organ of the guinea-pig with tetanus toxin should be as toxic as ever. That is precisely what does take place. When tetanus toxin is mixed with broken-down guinea-pig brain, the toxin is so anchored or fixed by the cerebral tissues that inoculation with the mixture is innocuous (Wassermann and Takaki). There is some difficulty in determining exactly what has taken place in these circumstances, but the most obvious explanation is that the combining affinities of the toxin molecules have been saturated by the corresponding affinities in molecules of cerebral tissue, and have thus been deprived of effective toxicity. Hence, as the theory had led us to expect, the brain of a normal guinea-pig does act as an antitoxin. Further, an emulsion of other organs of the guinea-pig is unable to bind the toxin molecules, so that the mixture remains toxic on injection. Obviously such facts as these lend very strong support to the theory which Ehrlich has put forward.

3. *Relation of antitoxin to tissue.*—Consider next what explanation of the origin of antitoxin is possible on this theory. We have seen that the first condition of toxic action is the possession by susceptible tissue molecules of receptors (side chains) capable of fixing toxin molecules to them. Without such receptors the cell, or tissue molecule rather, is naturally immune. The union of toxin molecules with the receptors of protoplasmic molecules, when it does occur, is both strong and lasting, and, while it endures, the receptor cannot exercise its normal function—the fixation of nutritive molecules. It is, for the time being, rendered useless and inert, in other words, a defect has been produced, and, according to a general biological law, this must be repaired by regeneration (Ehrlich). The law still holds even when mere atom groups (receptors) of protoplasmic molecules are rendered useless by the fact that toxin molecules have become anchored to them, and, therefore, fresh receptors are formed by the cell to replace those put out of action by the toxin. If now additional quantities of toxin gain access to the cells, as in the process of immunisation, experimental or natural, then the freshly formed

receptors become in turn saturated by the toxin, and a second process of regeneration is called forth. And, as the doses of poison increase, so the receptors are regenerated in increasing numbers. Then another biological law comes into operation, since, when regeneration occurs in response to repeated stimulation, the resultant compensation tends to proceed far beyond the necessary limit—indeed, over-compensation is the rule (Ehrlich). There, therefore, comes a time when this persistent and progressive regeneration of receptors reaches an excess. The receptors are produced in numbers too great for the cell (protoplasmic molecule) to carry, and are very properly jettisoned—thrown off after the manner of a secretion into the blood and body fluids. Thus, as a result of repeated toxic action, the blood becomes full of free atom groups—the cast-off receptors of susceptible cells regenerated in excess—and these atom groups in the circulating blood have a chemical affinity for the combining atom groups of toxin molecules. But this is precisely the characteristic of the antitoxin molecule, and, therefore, we have come to this, that antitoxins represent nothing more or less than these cast-off receptors of susceptible cells regenerated in excess, and appearing in a free state in the blood and body fluids.

This theory of the origin of antitoxins affords an explanation of many otherwise obscure details in the production of immunity. In the first place, although I have spoken of antitoxin being represented by the cast-off receptors of susceptible cells, you are not to suppose that the toxic action of the toxin is the essential factor in the formation of antitoxin. On the contrary, the influence of the toxophore atom group is detrimental to the processes of cell life, it disturbs the regeneration of the lost receptors, and therefore impedes, if it does not entirely arrest, the formation of antitoxin. Hence, in a severe infection, when bacteria are elaborating large quantities of a highly virulent toxin, the cells on which the poison acts may be rendered quite incapable of antitoxin formation, and the patient rapidly succumbs. The highest degree of immunity, as a matter of fact, is attained by those animals in which the administration of toxin has been very cautiously begun, and in which the subsequent doses have been so carefully regulated that no symptoms of illness have appeared even

when the animal receives many times the minimum lethal dose.

It is not the poisoning but the combining affinity of the toxin that stimulates antitoxin formation, so that the production of immunity depends, not upon the reaction of cells which are susceptible to toxic action, but upon the reaction of cells which are capable of fixing the toxin. It is the fixation of the toxin that determines the formation, and, therefore, antitoxin is formed by all those tissues whose cells possess toxophile atom groups. In the guinea-pig, antitoxin is formed only in the central system, since the toxin is fixed by no other tissue. In the rabbit the great bulk of its antitoxin is formed in other organs, since only a small proportion of toxin is fixed in the brain. Indeed, we have the further remarkable fact that animals like the alligator, which are naturally quite immune to tetanus, may yet be made to yield a supply of antitoxin, simply because the tissue elements are capable of fixing the toxin, though quite insusceptible to its poisonous action (Metchnikoff).

We can go still further, however, in this application of the theory. If the toxophore atom group is useless, or worse than useless in the production of antitoxin, if only the haptophore group is of any avail, then, clearly, molecules of toxin, in which the former group is destroyed but the latter group persists, ought to be even more effective in stimulating the formation of antitoxin. You remember that such mutilated toxin molecules exist in old samples of crude toxin and are known as toxoids. Injection of toxoids, then, ought, on our theory, to be at least as effective as the injection of toxins in producing a high degree of immunity. And this is found to be the case. Indeed, not only can immunisation be successfully effected by the use of toxoids in the place of toxins, but in the case of highly susceptible animals immunity is more readily attained by the administration of toxoid alone. For the effect of toxin is partly to derange metabolism, and so to interfere with the vital reaction of the tissues on which the formation of antitoxin depends, whereas the effect of toxoid is to stimulate the production of antitoxin without impairing tissue vitality.

To assist the realisation of these phenomena, Ehrlich quotes Weigert's illustration from physical science. Iron, he says, attracts electricity, and is therefore used as a lightning con-

ductor. But the mere presence of iron in a building, so far from acting as a protection against lightning, renders the building more liable to be struck. Only when the iron is so disposed that it conducts the lightning away does it confer immunity. Now, just in the same way the atom groups in tissue molecules that anchor the combining groups of toxin molecules play the part of the iron and attract toxin molecules to them. So that, if these toxophile atom groups remain in combination with the tissue molecules, then the toxin molecule is anchored to them, and toxic action may follow. But, if the same atom groups are separated from the tissue molecules and meet the toxin molecule in the circulating blood or outside the body, then they act the part of the lightning conductor, attract the toxin to themselves, and thus render it harmless.

(*To be continued.*)

OBSERVATIONS ON MITTELSCHMERZ

By S. J. MURDOCH CAMERON, M.B., B.Ch.,
Late Senior Resident Surgeon, Glasgow Maternity Hospital

CASES of Mittelschmerz or intermenstrual pain are of sufficiently rare occurrence in gynæcological practice to permit their publication. Moreover, the ætiology of this condition is so obscure that it lends itself to innumerable conjectures. Unfortunately our knowledge is scanty in connection with the pathological changes present in the uterus and adnexa, and thus the only real guide to successful treatment is wanting. In the year 1872, Sir Wm. Priestly, in the *British Medical Journal*, noted the occurrence of such cases, and since that date the literature of the subject has increased somewhat, as Continental gynæcologists have devoted considerable attention to the condition. Nevertheless, our knowledge has not increased to any marked extent, and even now the ætiology of such intermenstrual pain is a matter for much speculation. True cases of Mittelschmerz are characterised by the regular occurrence of paroxysmal pain in one or other ovarian region during the intervals of menstruation. The regularity with which the pain begins is one of the most prominent symptoms

in Mittelschmerz. The time of onset after the cessation of a period may be said to be constant for the individual, but it varies in different patients. Some have thought that the onset of pain bears a more definite relation to the period about to follow than that which has gone before. In some patients the pain comes on after an interval of four days, whereas in the case reported below it did not manifest itself until the fifteenth day. However, when paroxysmal ovarian pain comes on between the periods every month at a definite time and lasts for a certain number of days, the condition known as Mittelschmerz should be suspected. The pain may last for a day or two and then disappear, or it may continue till the ordinary menstrual period begins. The pain as a rule is limited to the ovarian region, but occasionally it extends across the lower abdomen, and not infrequently it is located in the groin. Rarely the pain may be present in the right ovarian region during one month, and next month when the attack comes on the pain is situated over the left ovarian region, and thus it may alternate from month to month. This condition is unusual, but to me it suggests the improbability that all cases of Mittelschmerz are associated with inflammatory changes in the region of the ovaries. Moreover, the character of the pain does not resemble the premenstrual pain so distressing to subjects of a salpingo-oöphoritis. Another point which seems to be against a constant inflammatory condition is the fact that posture seems to have no influence on the pain, whereas the vast majority of patients with inflammatory changes around the ovaries and tubes gain a certain amount of relief when the recumbent posture is assumed during the premenstrual pain. During intermenstrual pain, or immediately after its cessation, a certain amount of discharge may occur, which may be blood-stained, mucous, or watery, the latter condition being attributed to a hydrops tubae profluens. In other cases no loss is present.

Ætiology and Pathology.

The majority of writers have described inflammatory changes in the tubes and ovaries, and the intermenstrual pain has been explained by supposing that in these cases the follicle

cannot readily rupture on the surface owing to the thickening of the ovarian capsule, while intermenstrual ovulation constantly takes place. In connection with this statement, it should be mentioned that very frequently in cases of Mittelschmerz, thickening in the region of the ovary and broad ligament can be felt by vaginal examination. Again, intermittent hydrosalpinx has been described as a cause of the condition, and to me it seems a not unlikely cause in those cases where the watery discharge is a prominent symptom. Others have suggested that an inter-monthly cycle is present, as well as the ordinary monthly one. It is conceivable that an embryological factor might play a part in bringing about symptoms very akin to Mittelschmerz. If a septate uterus were present, in which one half menstruated at a different date from the other half, and provided that such menstruation was more scanty and painful than the loss from the other division, one would then have symptoms very closely resembling Mittelschmerz. When I was resident medical officer to the Chelsea Hospital for Women, I had the opportunity of examining the Fallopian tubes, together with a fibro-myomatous uterus removed during a menstrual period. The tube on one side contained a blood-stained fluid in which epithelial cells were suspended. The condition was altogether unlike anything I had seen in tubes removed at intermenstrual periods. The fluid contents could be made to communicate with the uterine cavity, so that no great degree of obstruction was present. The amount of the fluid contained was very small, but nevertheless it led one to wonder if the Fallopian tube was always inactive during menstruation. Of late pathologists seem less apt to dogmatise on their inactivity; and Robinson, of Chicago, after the examination of 800 tubes, came to the conclusion that the Fallopian tubes during menstruation very often contain fluid. May it not be that some cases of Mittelschmerz owe their origin to this condition?

If a tube show such activity, not at the time of the ordinary menstrual period, but between the periods, the production of intermenstrual pain and discharge can be understood, for the power of contraction in the muscular wall of the tube is well marked, as is instanced in cases of tubal abortion. Again, when the tube is separated from the uterus it can frequently be

seen to contract, and thus such a case as the one described below might be explained, where subsequent to the pain and discharge of fluid material there was a diminution of the tubal swelling. Such a theory cannot be put forth in many cases, in view of the work done by Heap and Bland-Sutton in connection with the study of the Fallopian tubes of the Entellus and Macaque monkey during menstruation. These authorities detected no change in the epithelium of the tube, yet, nevertheless, in consideration of Robinson's research, one hesitates to dismiss hastily the improbability of tubal change in association with menstruation. It is also somewhat suggestive, in the case described below, that the "intermenstrual pain" did not recur during pregnancy, yet it may be urged that its absence was accounted for by suspension of ovulation.

Croom has laid stress on the presence of endometritis as causing intermenstrual pain, but in the case recorded here it is unlikely that such a lesion could account for the patient's condition, as the uterus was not enlarged and discharge was only present during an attack of pain, while, in addition, the ordinary monthly periods were not excessive, and later the patient became pregnant and carried the child till full time. As a rule the great majority of patients are sterile, although in one recorded case the symptoms did not begin until after the birth of a child. As palliative treatment does but little good, and the removal of ovaries and tubes has been the treatment recommended, it may not be out of place to plead that radical operative procedure should only be resorted to after a considerable lapse of time, as pregnancy is a possibility.

A. M., æt. 25, married about three years, sought advice at the out-patient department, Chelsea Hospital for Women: (1) on account of severe intermenstrual pains; (2) to ascertain if any condition existed which could prohibit conception. Menstruation commenced at the age of 15 years, and was regular in its occurrence, the duration being 5 days in 28. She has always had a scanty loss, and pain of a griping nature is very severe on the first and second days of the flow. There is a certain amount of premenstrual pain, but she states that it is quite unlike the pain which comes on fifteen days after the cessation of her ordinary period. The intermenstrual pain has been troublesome for some years, but she is unable to state

her exact age when it commenced. She describes the pain as having a "twisting" character, and it occurs in paroxysms over a period of three days. So severe is it that she dreads its onset, and states that the pain present on the first two days of the ordinary period gives her much less discomfort. It manifests itself with unfailing regularity on the fifteenth day after her period ceases, and even although she remains in bed no relief is experienced. The pain is situated in the right ovarian region, and sometimes it extends across the lower abdomen. On many occasions it is accompanied by a blood-stained discharge, while at other times a leucorrhœal discharge is present, and not unfrequently a watery fluid is noted; but, whatever be the character of the loss, she is compelled to wear diapers during the time the pain lasts. She asserts that fifteen months ago she was about six weeks advanced in pregnancy when she aborted. On vaginal examination the cervix was found to have nulliparous characters, while the uterus was normal in size and position. The tube and ovary on the left side were normal, but on the right side there was an indefinite small swelling in the region of the tube and ovary. It was freely movable, and pressure on it elicited acute pain. Mr Lionel Provis, who was present, examined the patient, and agreed with me as to the presence and mobility of the swelling. The examination was made about the fourteenth day after the monthly period. Mittelschmerz was diagnosed, and the patient was given analgesic medicine to ascertain if it in any way influenced the pain. From time to time the patient was seen, but she experienced no relief from treatment. It was at last thought advisable to admit the case to hospital to determine whether surgical interference would be necessary. On her admission into hospital she stated that she had missed her last monthly period, and as the mammary veins were distended it was suspected that conception had occurred, and later these suspicions were justified. The right ovary and tube were found to be absolutely normal when she was examined under an anæsthetic, and, moreover, the "intermenstrual pain" did not assert itself while she was pregnant. Her medical attendant, Mr M'Clure, has written to state that he delivered her of a full-time child.

Clinical Record

NOTES ON TWO FURTHER CASES OF ACUTE INTUSSUSCEPTION IN INFANTS—LAPAROTOMY—RECOVERY

By GEORGE L. CHIENE, M.B., F.R.C.S.,
Assistant Surgeon, Royal Infirmary, Edinburgh

CASE I. R. M'A., male, aged six weeks, was admitted to the Sick Children's Hospital on November 12th, 1903.

At 7 A.M. on the morning of the 11th he suddenly awoke with a "strange cry," and afterwards vomited. The mother thought the child was suffering from abdominal pain. He continued to vomit at intervals during the day and refused the breast.

The same evening, at 7 P.M., he first passed blood *per rectum*, along with a motion; he again passed blood at 11 P.M. and 1 A.M. The intervals between the attacks of pain and tenesmus gradually increased.

Dr Dickson saw the case at 1 P.M. on the 12th, and immediately sent it up to hospital.

On admission. — Abdominal facies well marked, mouth drawn, eyes sunken, cry short and weak, pulse 140, resp. 40; visible fulness on left side of abdomen, which, on palpation, was found to be an elongated tumour, occupying the left iliac fossa; the right iliac fossa was empty. *Per rectum.*—The tumour was easily felt, and the examining finger was covered with blood and mucus.

At 3.30 P.M. (thirty-two and a half hours after the onset) the abdomen was opened above the umbilicus through the right rectus muscle, coils of small intestine emerged, but the intussusception was soon found and brought out through the wound. The greater portion was easily reduced, but as usual the apex gave trouble. The glands in the region were markedly congested as well as the apex, which it was found impossible to reduce by pressure from below.

On account of the age of the patient resection was thought to be inadvisable.

The involved gut was covered with large gauze swabs and then steadily compressed with both hands for some minutes; by this means the congestion was to a great extent relieved, with the result that reduction by pressure from below, although difficult, was possible. The mesentery of the small intestine was then brought in contact with that of the cæcum by a

couple of catgut stitches, causing the lower end of the ileum to lie at an acute angle to the ascending colon with a view to prevent recurrence.

The intussusception was of the ilio-cæcal type.

At 6.30 the same evening, half a drachm of Henry's solution was given by the mouth; flatus passed at 8.30 P.M., and the child had two motions the following day.

The temperature went up to 102 the day after the operation, but from the third day onwards remained normal.

The child is now ten months old, and perfectly strong and healthy.

CASE II. On Jan. 28th, I saw W. M. C., aged two years, one month, on whom I had operated for acute intussusception a year and nine months previously.[1]

At 3 A.M. the child wakened with a desire to go to stool, was pained and fretted. During the morning he vomited at intervals and had three motions.

About 6 A.M. blood was noticed in one of the motions, when the parents for the first time suspected a recurrence of "the old trouble"; previously they thought the condition to be an "attack of the bile."

Dr Thyne was sent for, saw the child about mid-day and thought the symptoms all pointed to a second attack of acute intussusception. Half an hour later I saw the case with him. By this time the condition was pretty evident so the child was taken off at once in a cab to a "Home" and operated on at 1.15 (10 hours after the onset).

The diagnosis having been confirmed with the child under chloroform, the old scar above the umbilicus was opened up, the intussusception was brought out through the wound and reduced by pressure from below. The gut was congested and œdematous, as also were the mesenteric glands in the region of the ilio-cæcal valve.

The mesentery of the small intestine was stitched as in the previous case, causing the lower end of the ileum to lie at an acute angle to the cæcum and ascending colon with a view to prevent recurrence.

The gut was returned and the abdominal wound stitched up. Before the operation the pulse was 136 per minute, the next day it had fallen to 98.

The temperature was normal and remained so till the 10th day, when the child left the "Home." Two drachms of Henry's

[1] For notes of first attack and resulting operation, see the *Scot. Med. and Surg. Journal*, Jan. 1903.

solution were given by the mouth as soon as the patient recovered from the effects of the chloroform and the following day a large motion was passed.

Since the operation the child has remained in good health.

Remarks.

The cases mentioned are both of some interest: the first because of the age of the patient and the method employed to aid reduction, which at first seemed impossible. As far as I know the method is not advocated in the British text-books, but I find it mentioned in one of the American surgical text-books. I think it will be found useful in cases in which the difficulty of reduction is purely due to congestion.

The second case is of interest from the fact that the attack was practically a repetition of the previous one, an interval, however, of a year and nine months having elapsed. This is quite a distinct condition from those so-called recurrences after reduction by inflation, which are probably instances of incomplete reduction.

I would again urge the importance of *early diagnosis*, which lies in the hands of the practitioner, and *early operative interference*. The former case shows that laparotomy is not contra-indicated even in an infant a few weeks old, and the latter that recurrent attacks can be successfully dealt with by operative procedure.

I think the day will come when the treatment of acute intussusception by non-operative methods will be mentioned in the text-books as being of historical interest only, but this is neither the time nor the place to discuss that question.

The cases noted, however, may perhaps draw attention to the advantages of the operative method.

Editorial Notes and News

Cleanliness in Public Life.

THE Scots, we fear it must be confessed, have never been particularly noted for that virtue which is next to godliness. Neither admirers nor critics of our country have been silent on this subject. Dr Johnson, as he wandered up the Canongate with Boswell, grumbled at the filth of the streets, and complained, "I can smell you in the dark." Sydney Smith, writing

at the close of the eighteenth century, said of the natives of Scotland that "they certainly do not understand cleanliness." Various proverbial sayings which might serve as mottos for an essay in praise of dirt bear similar witness. Perhaps the unkindest cut of all is contained in a story the late poet-laureate was fond of narrating. Noticing a very large stone trough somewhere on the south side of the border, he inquired of a passing native what this was intended for. "That," said the fellow, "why, that's where we used to wash the Scots before we hanged them."

Of course, things have changed very much for the better in recent years, but are we not still far too easily contented? Indeed, there is one respect, at least, in which we are actually worse off than our fathers, and that is, the condition of the atmosphere in large towns and their neighbourhood. Some observations were made recently on the atmosphere of Glasgow by Mr Fyfe, the chief sanitary inspector, with the object of determining the amount of solid matter in the air. Observations were made in various districts, and the results differed greatly according to the situation; but taking all these together, it was estimated that the dust pollution of the air of the city amounted to 36·44 cwts. per acre per annum; 1166.08 tons per square mile per annum; and 23,321 tons each year on the area of the city. Such a condition of things is obviously very lamentable, and is one for which some remedy must be found if anything which can be called cleanliness is ever to be possible for the town dweller.

The twenty-three thousand tons of dust deposited each year from the air of Glasgow doubtless form a very small proportion of the total amount of filth annually distributed over the streets. Recent bye-laws in Edinburgh have done a little towards improving the state of the public thoroughfares, but a considerable quantity of house and shop refuse still finds its way into the streets. A more serious nuisance, and one more difficult to deal with, is constituted by the deposits of horse dung, and in some parts of the town by similar deposits from cattle and sheep. After a few days' dry weather many of the busy streets become positively disagreeable to walk in from this cause, and if the wind, which is never long idle in Edinburgh, springs up, it is scarcely pleasant to reflect on the

source of the dust which blows into one's eyes and mouth, and covers one's clothes. It is difficult to suggest any sufficient remedy for this nuisance. Doubtless it will cure itself in time, through the gradual extinction of that noble animal the horse by the rapidly multiplying motor. Meantime more efficient scavenging, a more liberal use of water on the streets in dry weather, and an extended use of the new rotary brushes at present employed in Princes Street, might lead to some amelioration. Several ingenious people have invented apparatus for attaching to horses to catch the dung, and prevent it falling on the streets. An apparatus of this kind was figured in the *British Medical Journal* some little time ago. We do not know whether these appliances have been found to work well in practice, but if any of them do, it would certainly make an extraordinary difference in our streets if their use were made compulsory. There is no chance of any appliance of this kind ever coming into use voluntarily. It would meet with more ridicule than the first umbrella. But if an appliance had to be worn by all horses, we should cease to notice it in a week, or, at least, it would look no more peculiar than a hansom cab or a pneumatic tyre does now.

The nicest problems of cleanliness are presented by the food supply, and of these the milk problem is undoubtedly first in importance. Perhaps we should scarcely speak of this as still a problem, however, for it has been shown on a large scale in America, and on a smaller scale by one or two enterprising milk dealers in England, that it is quite possible commercially to produce and distribute a clean milk, and the only part of the problem which now awaits solution is presented by the apathy of the public. The unspeakably filthy conditions frequently found where the milk is produced, and the certainty of contamination during distribution, have been well exposed in the press, and the lessons to be learned have been rubbed in by articles with such elegant titles as "Pus as a Beverage." But the principal lesson which many of the public seem to have taken to heart from such investigations is that it is never safe to read articles on the milk supply, unless you wish never to be able to drink milk comfortably again! The distribution of meat also demands attention. If we were really more in love with cleanliness than our fathers, we

would scarcely continue content to see meat driven about town in open carts exposed to the air and dust, or covered with dirty cloths, as at present.

The only people who seem really to have solved the problem of cleanliness are the surgeons, whose operating theatres are ideals which the rest of the world can only admire and envy at a distance. May we not look to the surgeons to do one thing more for us, namely, to give a word of counsel and extend a helping hand to their brothers the barbers. Is it not just a little to the discredit of the medical profession that hairdressers' shops are—well, what they are?

The art of keeping clean is certainly of special interest to medical men, considering the part played by dirt and uncleanly habits in the propagation of disease. In pointing a better way we have certainly not been idle, and the very electric light standards in Edinburgh bear witness to the respect in which our opinions are held—we wish the flagstones below did the same. But there are many details of our daily life which would be all the better for a little vigorous criticism, and concerning which we doctors seem all too chary of letting our voices be heard in the street.

Registration of Nurses. WE hear a good deal just now in Scotland about "principles," but we hardly know to what the British Medical Association is committed by its approval of the "principle" of Nurses Registration. The proposal, or is it the principle, is violently opposed by an imposing list of signatories commencing with Mr Sydney Holland and comprising many treasurers of hospitals and the matrons of most of the larger hospitals in London and the provinces. Their memorial runs on the familiar line of setting up a supposititious argument, and then ruthlessly demolishing it, and so their first point is to demonstrate that the passing of an examination is not an efficient test of a nurse's capabilities. We entirely agree with this, and indeed with a great deal in the memorial. It is quite obvious that no registration could guarantee a nurse's or anybody else's moral character, and surely even the most fervid advocate of registration does not expect it to do so. The memorial seems to fear that, registration once in force, no one would ever apply to the matron of a hospital to recommend a nurse, and they argue that no one would engage, say, a registered cook without a character.

There is no doubt some force in the argument that it will be

most difficult to remove a nurse from the Register. The same difficulty is found in all other similar circumstances, but too much must not be made of it.

The fallacy of the memorial lies in the assumption that examination is the essence of registration. For nurses it is training which is all important, and we submit some suggestions which we believe might form a basis on which legislation might safely be founded.

1. That a Central Council be appointed consisting of Representatives of Matrons, Nurses, and Medical Men, with Branch Councils for each of the three divisions of the Kingdom.

2. That the Council appoint a Registrar whose duty it shall be to keep a Register of Trained Nurses.

3. That the Council shall have power to inspect all Training Schools for Nurses, and to regulate the nature and amount of the training and teaching in such Schools.

4. That the Council shall accept for purposes of Registration such Nurses as shall produce evidence from their Training School, and the Matron of it, that they have been trained, and that they are efficient Nurses, and of good moral character, and of a disposition likely to make a good and kind Nurse.

5. But that the Council shall not have power to examine or re-examine any such Nurse holding such Certificate, before admitting (his or) her name to the Register.

6. That Nurses who are at present working, who possess Hospital Certificates of not less than three years, or who, possessing a Hospital Certificate of one or two years, have done continuous private nursing or district nursing to the satisfaction of the Medical Men employing them for not less than three years, be admitted to the Register, if they apply for such admission within one (or two) years from the passing of this Act.

7. That it be made a penal offence for anyone to adopt the title Registered Nurse who is not on the Register.

8. But that the passing of this Act does not prevent anyone from nursing the sick, either for hire or gratuitously, so long as the person does not assume the title of Registered Nurse.

Accommodation of Nurses.

THERE are other questions regarding nurses than that of registration. An increasingly important one is that of their accommodation. Time was when two or three nurses were supposed capable of taking charge of a large ward. Now, the minimum of efficiency is placed at about one nurse to every five patients, and in training schools the proportion sometimes goes as low as one to three. Under these changed circumstances the hospital management is often hard put to it to find accommodation for

the growing numbers, and is sometimes constrained to resort to makeshifts of an undesirable kind. Garrets are converted into bedrooms, beds are doubled, and sometimes want of money compels the managers to divert small wards from their natural occupants to the use of the increasing army of nurses. All of these expedients are unfortunate, but we have no hesitation in saying that the diversion of beds from their rightful and much needed use is a plan of which the public will strongly disapprove. Fortunately, under the organised regime which prevails in all well-managed hospitals, there is no absolute necessity for the junior nurses to live inside the institution. Houses in the immediate neighbourhood are always available, and in these the nurses could be accommodated in comfort and decency, and kept fit for their really arduous duties. It is not fair to expect a lady to make one of a party of four in a male ward side-room with, we suppose, the privilege of an occasional bath in the ward bathroom. Managers should lay the matter before the charitable public, and they would soon find the remedy. It will be poor consolation to the unfortunate patients who are crowded out that the fortunate ones inside each enjoy the ministrations of one-third of a nurse.

The Curricula of American Medical Colleges

Two years ago the National Confederation of State Medical Examining and Licensing Boards appointed a committee to report upon the curriculum of the Medical Colleges of the United States. A year ago a report upon the work of 43 of these colleges was presented to the Confederation. This report showed such a lamentable want of uniformity in regard to the length and character of the medical course in the various institutions, and such striking variations in regard to every subject in the curriculum, that the chairman of the committee, Dr Geo. W. Webster of Chicago, was directed to continue the work of inquiry. Dr Webster has now presented a full report[1] dealing with the curriculum of 157 medical colleges, to each of which he sent a circular letter setting forth the desires of the committee and the objects of the work, urging co-operation, and promising copies of the report to all who co-operated in its preparation. Of the colleges applied to, a few sent no reply, although written to three times, and a few refused to supply information, saying that they were "engaged in more important work," but eventually reports were received from 124 colleges. From these Dr Webster has prepared tables showing the number of years of study required by each college, the number of months in each term of study, the subjects of the curriculum prescribed, and the number of hours

[1] *New York Medical Journal*, July 23, p. 145; July 30, 1904, p. 205.

devoted to each. From this table we find that practically all the colleges require a four years' course. One alone requires five years. This period does not seem to include time given to preliminary scientific studies, but there is no approach to agreement as to entrance requirements. Each term (year) of medical study varies from six to ten months, the lower figures predominating in the lists. The greatest discrepancies appear in the time devoted to individual subjects. A few examples may be cited in illustration.

General Medicine.—Highest, Atlanta College of Physicians and Surgeons, 2221 hours; lowest, Physio-Medical College of Texas, 78 hours. Average, 536 hours.

Orthopædic Surgery.—Highest, University of Nebraska, 780 hours; lowest, Long Island College Hospital, 13 hours. Average, 61 hours.

Anatomy. — Highest, University and Bellevue Hospital Medical College, 1248 hours; lowest, Physio-Medical College of Texas, 126 hours. Average, 480 hours.

Bacteriology.—Highest, Chattanooga Medical College, 606 hours; lowest, Eclectic Medical College, New York, 20 hours. Average, 138 hours.

Pædiatrics.—Highest, Illinois Medical College, 392 hours; lowest, University of Virginia, 18 hours. Average, 98 hours.

Similar discrepancies are found in regard to all the other subjects of the curriculum. The highest total requirement is that of the Atlanta College of Physicians and Surgeons, 10,124 hours; the lowest, that of the Physio-Medical College, Texas, 958 hours. Average, 4257 hours.

After discussing at some length the basis upon which the medical curriculum should rest, and the principles which should determine the ideal medical course, Dr Webster proceeds:—

"It should be so constructed as to give the student as many hours of work each day in the college as can be well done, say, from five to seven, leaving sufficient time for study, and it should then be extended over as many months as the multiplicity of subjects and the increase in the sum total of medical knowledge has made necessary, limiting each subject and measuring its time allotment in accordance with a conservative estimate of its relative value as an element of substantial medical education, as shown by the average time allotted to it by its teachers in the medical colleges of the United States.

"It should be so constructed as to give the proper relative time to clinical and laboratory instruction, as well as to recitations and lecture work. Each student should do at least five hours a day of work in the college, and this should extend over thirty weeks of actual work, exclusive of holidays, thus making

the term eight months, and the number of hours in the term or year, nine hundred.

"To accomplish the same amount of work in six months, the student must do seven hours of college work a day, and this does not allow sufficient time for study, exercise, recreation, and rest."

The general adoption of some definite standard of study will obviously be an advance on the present condition of chaos. A uniform standard to be adopted by all medical schools certainly cannot be an ideal standard. Still it will serve as a basis for reform and advance, it will encourage mutual recognition and reciprocity, and it will give a medical qualification a reasonably definite value. "In the evolution of an ideal," says Dr Webster in conclusion, "or even a satisfactory medical curriculum, I freely grant that there is no such thought in my mind as arriving at the ideal; there is no such thing as a stopping place, a resting place; but may there not be a halting place, where we may go forward as a unit, as a solid phalanx and not as stragglers, each one fighting by himself and for himself."

The standard curriculum proposed was unanimously adopted by the Confederation, and is shown below. The standard of preliminary entrance requirements was not adopted, but the committee was instructed to make a special report on this subject next year.

1. The standard curriculum which is to be adopted as a minimum for the degree of M.D. shall consist of the following:—

a. The course shall consist of four terms in four separate calendar years.

b. Each term shall consist of thirty weeks of work, exclusive of holidays, and of at least five hours of college work each day, and thirty hours in each week, or nine hundred hours of actual work.

c. The entire course of four years shall consist of not less than 3600 hours of actual work.

d. This should be a standard of *required work.* Any *elective* work should be *in addition* to the above.

e. The average time devoted to each subject in the curriculum should be approximately the average time now devoted to it as shown in this report.

f. Clinical work should constitute at least one-fourth of the total number of hours in the four-year course.

2. This medical course should have the following foundation:—

a. Seven years in the primary school.

b. Four years in the high school, preference being given to the scientific, rather than the literary, course.

c. A special course of two years in biology, physics, and

modern languages, or a college course in which the last two years shall have been modified to meet the demands of the medical student.

The Index Medicus. WE are requested to intimate that the statement that the *Index Medicus* had ceased to appear is absolutely incorrect. Owing to "strikes" in the printing trade there was some delay in the issue of one of the numbers, but since then the *Index* has been, and will continue to be, regularly issued by the Carnegie Institution, Washington, D. C.

Monthly Return of the Births and Deaths registered in Eight of the Principal Towns of Scotland during August 1904

DURING the month of August 1904, there were registered in the towns of Glasgow, Edinburgh, Dundee, Aberdeen, Paisley, Leith, Greenock, and Perth, the births of 4327 living children, of whom 2171 were males and 2156 females. These births are equivalent to an annual birth-rate of 29.5 per thousand of the estimated population of these towns. In Greenock the equivalent annual birth-rate was 33.4; in Glasgow, 32.2; in Paisley, 31.8; in Leith, 30.9; in Dundee, 30.2; in Aberdeen, 28.4; in Edinburgh, 22.5; and in Perth, 21.6. The births registered during the month are 203 more than in July and 284 more than in August 1903.

Of the total births, 4010 were legitimate, and 317, or 7.3 per cent., illegitimate. This illegitimate rate was for the month highest in Dundee, 9.8; and lowest in Leith, 4.7; in Edinburgh, it was 9.3; in Perth, 8.1; in Glasgow, 7.0; in Paisley, 6.6; in Aberdeen, 6.1; and in Greenock, 5.1.

The deaths registered in these towns during the month numbered 2452, which is equal to an annual death-rate of 16.7 per thousand. This rate is 2.2 more than that for the previous month, and 1.7 more than for August 1903.

The death-rate was highest in Glasgow, 18.4; and lowest in Leith, 11.6. In Greenock, it was 16.0; in Dundee, 15.9; in Perth, 15.6; in Edinburgh and Aberdeen, 15.4; and in Paisley, 15.1. These rates, with the exception of those for Paisley and Dundee, are all greater than the rates for the previous month.

Of the 2452 deaths, 959, or 39.1 per cent., were of children of less than five years of age, and 537, or 21.9 per cent., of persons of over 60. Compared to the returns of the previous month, those of children of under five are 215 more, and those of persons of over sixty are 57 more.

The deaths of children under one year old numbered 648,

which is 212 more than in July, and equal to an infantile mortality of 151 per thousand births. This rate is 50 more than in July. The rate was highest in Glasgow, 173; and least in Perth, 86. In Aberdeen, it was 161; in Dundee, 146; in Edinburgh, 122; in Paisley, 114; in Leith, 109; and in Greenock, 92.

The seven principal epidemic diseases accounted for 352 deaths. This is equal to an annual mortality from these causes of 2.4 per thousand. These deaths are 139 more than in July, and 113 more than in August 1903. This increase is largely due to a prevalence of diarrhœas. The mortality from these epidemic diseases was highest in Glasgow, 3.2; and lowest in Leith, 1.2. In Paisley, it was 2.9; in Greenock, 2.4; in Dundee, 1.7; in Edinburgh, 1.6; and in Perth and Aberdeen, 1.4.

Deaths from whooping-cough numbered 112; from scarlet fever, 11; from measles, 30; from typhoid fever, 8; from typhus fever, 1; from diphtheria, 11; and from diarrhœas, 178. Deaths from diarrhœas are 133 more than in July; from whooping-cough, 20 more; from enteric fever, 8 fewer; from measles, 2 fewer; while deaths from scarlet fever and typhus fever were of the same number as in that month. Deaths from influenza numbered 4; this is 2 fewer than in July, but 2 more than in August 1903.

Deaths from puerperal septic conditions numbered 9; from malignant diseases, 153; from apoplexy, 102; from heart disease, 237; from premature birth debility, 83; and from alcoholism, 8. Of the deaths due to malignant disease, 74 were ascribed to carcinoma, 7 to sarcoma, and 72 to cancer.

Deaths from pneumonia numbered 129, and constituted 5.3 per cent. of the total deaths; those from bronchitis numbered 78, and constituted 3.2 per cent. of the total deaths; and deaths from phthisis numbered 183, and constituted 7.5 per cent. of the total deaths. Deaths from pneumonia were 32 fewer than in July; from bronchitis, 21 fewer; and from phthisis, 11 fewer.

The Meteorological Returns for August 1904

THE meteorological returns for eight of the principal towns in Scotland, reduced and corrected as heretofore for instrumental errors, give for their mean position, *i.e.* Lat. 56°.12′ N., and Long. 3°.30′ W., and height 160 feet above the sea-level. For the month of August 1904.

Mean barometric pressure, 29.911 inches; greater than the average for the same month of 1856-1900 by 0.051 inch.

Mean temperature, 57°.5; greater by 0°.1.

Mean daily range of temperature, 15°.0; greater by 0°.9.

Mean humidity, 81 per cent.; being the average.

Rain, number of days, 19; greater by 3 days.
Rain, depth in inches, 4.37; greater by 0.94 inch.
Wind, mean force (on scale of 0-12), 1.7; greater by 0.2.
Wind, direction of: a 3 days' excess of winds from N.W. and N.

Hence the month of August 1904 was characterised by a rather high mean barometric pressure; an average mean temperature, with a slightly high mean daily range; a high mean rainfall, with a large number of rainy days; a considerable excess of moderate winds from N.W. and N.

The mean barometric pressure was 29.911 inches, or 0.051 inch above the normal. At Leith the sea-level pressure was above 30 inches on 2nd and 3rd, on 8th and 9th, on 20th and 21st, from 23rd to 25th, and on 28th and 29th, the extremes there being 30.167 inches on the evening of 23rd, and 29.255 inches on morning of 15th.

The mean temperature was 57°.5, or 0°.1 above the normal, the days being 0°.5 above and the nights 0°.4 below their respective averages. Temperature was equal to the normal at Paisley, decidedly above the average in the Edinburgh district, slightly above at Dundee, and a little below at the other chief towns. The month opened with a spell of warm weather, with maxima generally on the 4th, and a mean temperature for the first week at Leith fully 6°.0 above the average. Thereafter weather becoming steadily colder set in until towards the end of the month, high temperatures again occurring from 28th to 30th. The 20th was in general the coldest day of the month, the ground minimum at Glasgow falling to 33°.1, whilst the week ending 27th had a mean temperature from 3°.0 to 4°.0 below the average. The absolute maximum for the chief towns was 77°.9 at Glasgow on 30th, and the minimum 36°.5 at Perth on 20th.

The mean rainfall was 4.37 inches, or 28 per cent. above the normal. Aberdeen had a shortage of 28 per cent., and the reporting station at Glasgow a slight deficiency. In the lower Clyde area there was an average excess of about 10 per cent., whilst in the Edinburgh district and at Perth the amounts were more than half as much again as the average. At Dundee the excess was as large as 80 per cent. Heavy falls occurred in the West on 1st, but the greater part of the rain was precipitated between 4th and 18th. Daily falls of more than 1 inch were recorded at Dundee on 4th and 11th, at Leith on 11th, and at Edinburgh on 17th. At Dundee and Leith the aggregate for 17th and 18th exceeded 1 inch.

Thunder occurred at Dundee, Leith, and Edinburgh on 8th, at Leith on 9th, and at Dundee, Perth, and Leith on 18th.

Bright sunshine was deficient at Edinburgh, Aberdeen, and Glasgow, but above the average at Fort-William.

Medical Education in Scotland

IN order to obtain in Scotland a legal qualification to practise medicine, the student must conform to the regulations of the General Medical Council; he must pass a preliminary examination recognised by the Council; must then register as a medical student; must study at a recognised medical school for a period of at least five years after registration; and having then obtained a registrable degree or diploma, this qualification must be recorded in the *Medical Register.*

Each University confers four registrable degrees: Bachelor of Medicine and Bachelor of Surgery (M.B., Ch.B.)—which must be obtained and conferred at the same time, and which cannot be obtained until the candidate has attained the age of twenty-one years; Doctor of Medicine (M.D.); and Master of Surgery (Ch.M.). The three medical corporations, the Royal College of Physicians of Edinburgh, the Royal College of Surgeons of Edinburgh, and the Faculty of Physicians and Surgeons of Glasgow, co-operate in conducting conjoint examinations for the "Triple Qualification" (L.R.C.P.E., L.R.C.S.E., L.F.P.S.G.), which likewise admits to the *Medical Register.*

The Universities

PRELIMINARY EXAMINATION. — Each student must pass this examination before commencing medical study. At the matriculation office of each University, candidates can obtain schedules, which must be filled up and lodged not later than certain dates in March and September respectively. The fee for examination is 10s. 6d., and should be paid at the time of lodging the schedule. Candidates are examined on the following subjects:—

(1) *English.*—There is one paper comprising two questions on British History, two on Geography, four on Grammar (correction of sentences, parsing, analysis of sentences, and derivations), two of a literary and general nature, and the candidate has also to write an essay, and paraphrase a portion of verse. Answers are required to eight questions, and one answer in History, one in Geography, the essay, and the paraphrase are essential.

(2) *Latin.* — Translation, Parsing, Grammar, Prose Composition, and Sentences.

(3) *Elementary Mathematics.* — (*a*) Arithmetic (fractions, proportion, percentage, square root, and simple interest); (*b*)

Algebra (fractions, factors, square root, equations of the first degree, simultaneous equations of the first degree, quadratic equations and problems leading thereto); (*c*) Geometry (Euclid, Books I., II. and III., or their equivalents, with simple deductions).

(4) *Greek, or French, or German.*

French or German.—Grammar, translation into English and into French or German, and short idiomatic sentences for translation from English.

Greek.—Grammar, translation into English, and of short sentences into Greek.

It is compulsory that the subjects be passed at not more than two examinations, but there is no restriction on the number of times the candidate may present himself for examination. A degree in Arts or Science in any University of the United Kingdom, and in any Colonial or Foreign University specially recognised, the Lower Grade Leaving Certificate of the Scottish Education Department, and certain other examinations, are accepted as equivalents for the preliminary examination. The preliminary examination conducted by the Educational Institute of Scotland is not accepted as an equivalent examination.

MATRICULATION.—Having passed the preliminary examination, the student must, within fifteen days after the commencement of the session, make the required entries in the Matriculation Album of the University, and pay the matriculation fee, which is one guinea for the whole year, half a guinea for the summer session alone. The student must matriculate each year of study.

REGISTRATION.—Within fifteen days after commencement of study, he must register as a medical student. He must be not less than sixteen years of age, must have passed the preliminary examination, and must produce to the Registrar (James Robertson, Esq., 54 George Square, Edinburgh) an application form duly filled up, showing that he has commenced medical study.

THE CARNEGIE TRUST.—This Trust is prepared to pay the class fees of students (who have passed the University preliminary examination) for all classes, whether attended within the University or within the School of Medicine of the Royal Colleges. The Trust is also prepared to pay the class fees for students proceeding to the Triple Qualification, provided that the applicant has passed the preliminary examination recognised by the Trust. It is also prepared to pay the fees for the various special classes given by many of the Lecturers upon advanced and non-compulsory subjects. Three qualifications

are demanded: the applicant (1) must be over sixteen years of age; (2) must be of Scottish birth or extraction, or must have given two years' attendance after the age of fourteen at a school or institution under inspection of the Scottish Education Department; and (3) must be qualified by preliminary examination under the ordinances of the Scottish Universities Commission and the regulations of the Joint Board of Examiners, to attend the classes for which payment of fees has been claimed. Schedules of application for admission to the benefit of the Trust are obtainable by written application to the Secretary of the Trust, 14 Hanover Street, Edinburgh.

Professional Education at Edinburgh University

It is more advisable for the student to commence study at the beginning of the summer than of the winter session. The student who commences in summer should attend the classes in the following sequence:—

First Summer.— Elementary Botany and Zoology.
Examination in these subjects in July.

First Winter.— Chemistry and Practical Chemistry.
Physics (three months' course).
Anatomy Lectures.
Examination in Chemistry, Practical Chemistry and Physics in March.

Second Summer.—Practical Anatomy—Histology.

Second Winter.— Physiology (Lectures, Practical Chemical and Practical Experimental Physiology), Practical Anatomy, Surgery,[1] Hospital and Clinical Surgery (after Christmas).

Third Summer.— Practical Anatomy, Practical Materia Medica, Clinical Surgery and Surgical Ward Work.

Third Winter.— Anatomy (Practical and Demonstrations), Materia Medica, Clinical Surgery and Surgical Ward Work (up to Christmas).
Examination in Anatomy and Physiology in March.

Fourth Summer.—Practical Pathology, Clinical Medicine and Medical Ward Work, Dispensary.
Examination in Materia Medica in July.

[1] Or in the third Winter Session.

Fourth Winter.— Pathology, Post-Mortems, Practice of Medicine, Midwifery and Gynæcology, Clinical Medicine and Ward Work.
Examination in Pathology in March.

Fifth Summer.— Forensic Medicine, Public Health, Hospital and Clinical Medicine, Ophthalmology, Diseases of Children (or Larynx, Ear and Nose, or Skin Diseases), Mental Diseases.

Fifth Winter and Final Summer.—
Hospital aud Clinical Medicine, Dispensary, Vaccination, Fevers, Practical Midwifery, Operative Surgery (in summer).
Examinations in Surgery and Clinical Surgery, Medicine and Clinical Medicine, Midwifery and Gynæcology, Forensic Medicine and Public Health in April, May and June.

If the student commences in winter, the course of study is as follows :—

First Winter.— Physics (three months), Chemistry and Practical Chemistry, Anatomy (Lectures and Practical).
Examination in Chemistry, Practical Chemistry and Physics in March.

First Summer.— Elementary Botany and Zoology.
Examination in these subjects in July.

Second Winter.— Same as above-mentioned second winter.

Second Summer.—Same as above-mentioned third summer, with in addition Practical Physiology (Histology).

And thereafter as in the above-mentioned Winter and Summer Sessions.

The candidate must attend Hospital for not less than three years; must attend both Clinical Medicine and Clinical Surgery for a period of at least nine months; twelve cases of Midwifery, or six cases and three months' attendance at a Maternity Hospital; and Post-Mortem Examinations for three months.

Two of the five years of study must be spent at the University, and not less than eight of the compulsory subjects of study must be taken in the University.

The University degrees are now conferred on Women Students. They do not attend the classes in the University, but at the Medical College for Women, Minto House, which is recognised by the University Court as a Medical School whose courses of instruction qualify for graduation in medicine.

Professional Examinations for M.B. and Ch.B.

First Examination.— Botany, Zoology, Physics and Chemistry.
Second Examination.—Anatomy, Physiology, Materia Medica and Therapeutics.
Third Examination.—Pathology.
Final Examination.—Medicine and Clinical Medicine, Surgery and Clinical Surgery, Midwifery and Gynæcology, Forensic Medicine and Public Health.

The candidate may pass in one or more subjects of an examination, even though he fail in the other subjects. The minimum expense for M.B. and Ch.B., including fees for Classes, Hospital, Matriculation and Examination, amounts to about £143.

Degree of M.D.

Each candidate for this degree, under the new regulations, must be of the age of twenty-four years or upwards, and must have obtained the degrees of M.B. and Ch.B. of the University. He must either have been engaged for two years in general practice, *or* for one year in the naval or military medical services, or in the medical wards of a hospital, or in scientific research. He must present a thesis written by himself on a medical subject, and pass an examination in Clinical Medicine. In this examination the candidate has to write a report and commentary on at least three cases, and has to show a practical knowledge in the applications of the ophthalmoscope, laryngoscope, electrical apparatus and sphygmograph, in the examination of the blood, and in the chemical and microscopical examination of the excreta.

The candidate who has graduated M.B. and C.M. under the old regulations may either proceed to the degree of M.D. under the old regulations (under which he is not required to pass an examination in Clinical Medicine, but must have passed examinations in Greek and in Logic or Moral Philosophy), or he may proceed to the degree as if he had graduated M.B., Ch.B. under the new regulations.

Degree of Ch.M.

Each candidate must be not less than twenty-four years of age, must possess the degrees of M.B., Ch.B., must have attended the surgical wards of a hospital for one year, or have spent one year in scientific research or in the naval or military medical services, or two years in practice other than that restricted to

medicine. He must submit a thesis on a surgical subject, and pass an examination on clinical surgery and its branches, surgical anatomy and operations on the dead body.

Fees for M.D. and Ch.M.

The fee for the M.D. degree under the old regulations is five guineas; for the M.D. or Ch.M., under the new regulations, ten guineas. The candidate must have paid the matriculation fee for the year in which he presents himself for examination or graduation. At each reappearance for examination, under the new regulations, the fee is five guineas.

DEGREES IN PUBLIC HEALTH.

Two degrees are granted by the University of Edinburgh in the department of Sanitary Science, viz., B.Sc. and D.Sc.

Bachelor of Science.

Candidates must be graduates in Medicine of a University of the United Kingdom or of some other recognised University. In order to obtain the degree, two examinations have to be passed.

First Examination.—Before entering for this examination, the candidate must, after graduating in Medicine, have worked in a recognised Public Health Laboratory for eight months, of which five consecutive months must be passed in the Public Health Laboratory of the University of Edinburgh.

He must also have attended in a Scottish University a course of lectures on Physics and a course of lectures on Geology, extending over three months, and both of which are approved of by the University Court.

The subjects of examination are as follows:—

(1) *Laboratory* work—Practical, written and oral; examination of water, air, foods, beverages, condiments, sewage; soils; disinfectants; building materials; clothing; bacteriology.
(2) Physics. (3) Geology.

Second Examination.—This cannot be taken until eighteen months after graduating in medicine; nor sooner than six months after passing the First B.Sc. Examination. The candidate must have attended two separate courses on Public Health, either in the University of Edinburgh or in some other recognised University or School.

Each course must consist of forty lectures, and includes

Medicine in its relation to Public Health and Sanitary Engineering.

The candidate must likewise produce evidence that (1) for six months he has studied sanitary work under a Medical Officer of Health for a county or borough of not less than 25,000 inhabitants; (2) that he has studied clinically for three months infectious diseases in a recognised institution; (3) that for three months he has been instructed by a recognised teacher in mensuration and drawing.

The subjects of examination are:—

(1) Sanitation; (2) Sanitary Law; (3) Vital Statistics; (4) Medicine in relation to Public Health.

The candidate is examined orally, practically, and by a written paper. *Sanitation* includes making reports on dwellings, workshops, hospitals, and sanitary schemes.

The University Court may modify the work and instruction prescribed from time to time.

Doctor of Science.

A graduate after having held the degree of B.Sc. for five years may present himself for the D.Sc. He must present a thesis, or a published work or memoirs, the result of his own research, and must pass an examination in Public Health, and in such of its special subjects as the Senatus may determine. The candidate must submit the subject in which he proposes to be examined for approval not less than two months before the examination.

Fees Payable.—First and second examinations, £3, 3s. each; for D.Sc., £10, 10s.

Institutions for Clinical Instruction in Edinburgh

Royal Infirmary. 740 beds and 40 cots. Fees—perpetual ticket, £12; one year, £6, 6s.; six months, £4, 4s.; three months, £2, 2s. Clinical instruction is given daily in Medicine, Surgery, and all their special branches.

Royal Hospital for Sick Children. 120 beds.

Royal Maternity and Simpson Memorial Hospital. 40 beds. The Maternity Residency affords accommodation for twelve students.

City Hospital for Infectious Diseases. 600 beds.

Royal Asylum, Morningside. 500 beds.

The fee for a qualifying course at each of these last four institutions is £2, 2s.

Victoria Hospital for Consumption and Diseases of the Chest. 50 beds. Out-Patient Department at 26 Lauriston Place.
Eye, Ear, and Throat Infirmary. 6 beds; 2700 Out-Patients yearly. Fee for three months, £1, 1s.
Royal, New Town, Medical Missionary (Cowgate), Western, Provident (Marshall Street), Eye and Skin Dispensaries.

Professors and Lecturers in Edinburgh

The courses given by the Extra-Mural Lecturers are recognised by the University and other examining boards as qualifying for graduation.

Botany— Professor Bayley Balfour, M.D., Botanical Gardens.
J. A. Terras, B.Sc., New School.
R. S. MacDougall, M.A., D.Sc.

Zoology— Professor J. Cossar Ewart, M.D., University.
Malcolm Laurie, D.Sc., Surgeons' Hall.
James Kerr, B.Sc., Surgeons' Hall.
T. W. Drinkwater, Ph.D., 5 Teviot Place.
Marion I. Newbigin, D.Sc., Minto House.

Biology— Malcolm Laurie, D.Sc., Surgeons' Hall.
Marion I. Newbigin, D.Sc., Medical College for Women, Minto House.

Physics— Professor J. G. MacGregor, D.Sc., University.
Dawson Turner, M.D., Surgeons' Hall.

Chemistry— Professor Crum Brown, M.D., University.
J. Falconer King, F.C.S., Minto House.
G. H. Gemmell, F.I.C., 4 Lindsay Place.
James Kerr, B.Sc., Surgeons' Hall.
T. W. Drinkwater, Ph.D., 5 Teviot Place.

Anatomy— Professor D. J. Cunningham, M.D., University.
J. Ryland Whitaker, M.B., Surgeons' Hall.
R. J. A. Berry, M.D., New School.

Applied Anatomy—
H. J. Stiles, M.B., University.
J. Ryland Whitaker, M.B., Surgeons' Hall.
R. J. A. Berry, M.D., New School.

Physiology— Professor E. A. Schäfer, LL.D., University.
D. Noël Paton, M.D., Surgeons' Hall.

Chemical Physiology—
D. Noël Paton, M.D., Surgeons' Hall.
John Malcolm, M.D., University.

Experimental Physiology—
D. Noël Paton, M.D., Surgeons' Hall.
Sutherland Simpson, M.D., University.

Histology— D. Noël Paton, M.D., Surgeons' Hall.
P. T. Herring, M.D., University.

Materia Medica and Therapeutics—
Professor Sir Thomas R. Fraser, M.D., University.
William Craig, M.D., Surgeons' Hall.
William Wood, M.B., 27 Nicolson Square.

Pathology— Professor W. S. Greenfield, M.D., University.
W. Russell, M.D., Medical College for Women.
Theodore Shennan, M.D., Surgeons' Hall.
Stuart M'Donald, M.B., New School.

Surgery— Professor J. Chiene, C.B., M.D., University.
F. M. Caird, F.R.C.S., New School.
J. W. B. Hodsdon, F.R.C.S., Surgeons' Hall.
H. Alexis Thomson, F.R.C.S., Minto House.
David Wallace, C.M.G., F.R.C.S., Nicolson Square.
Alex. Miles, F.R.C.S., New School.
J. W. Dowden, F.R.C.S., Medical College for Women.
A. A. Scot Skirving, C.M.G., F.R.C.S., 27 Nicolson Square.

Clinical Surgery—
Professor Annandale, F.R.C.S., Royal Infirmary.
C. W. MacGillivray, F.R.C.S., „
J. M. Cotterill, F.R.C.S., „
C. W. Cathcart, F.R.C.S., „
F. M. Caird, F.R.C.S., „

Practice of Medicine—
Professor J. Wyllie, M.D., University.
Alex. James, M.D., New School.
Byrom Bramwell, M.D., New School.
G. A. Gibson, M.D., Minto House.
Alex. Bruce, M.D., Surgeons' Hall.
R. W. Philip, M.D., New School.
R. A. Fleming, M.D., 27 Nicolson Square.

Clinical Medicine—
The Physicians of the Royal Infirmary.

Midwifery and Gynæcology—
Professor A. R. Simpson, M.D., University.
Sir J. Halliday Croom, M.D., Minto House.
D. Berry Hart, M.D., Surgeons' Hall.

J. W. Ballantyne, M.D., Surgeons' Hall.
A. H. F. Barbour, M.D., New School.
F. W. N. Haultain, M.D., New School.
J. Haig Ferguson, M.D., New School,
W. Fordyce, M.D., New School.
J. Lamond Lackie, M.D., Minto House.
Jessie MacGregor, M.D. (Gynæcology), Surgeons' Hall.

Insanity— T. S. Clouston, M.D., University and Royal Asylum.
Sir J. Batty Tuke, M.D., and G. M. Robertson, M.D., Surgeons' Hall and Stirling District Asylum, Larbert.

Diseases of the Eye—
G. A. Berry, M.B., University and Royal Infirmary.
G. Mackay, M.D., Surgeons' Hall and Royal Infirmary.
W. G. Sym, M.D., Eye, Ear and Throat Infirmary.
A. H. H. Sinclair, M.D. (Ophthalmoscopy), 45 Lauriston Place.

Vaccination—J. B. Buist, M.D., Western and Cowgate Dispensaries.
Francis Cadell, M.B., Marshall Street and New Town Dispensaries.

Diseases of Children—
Staff of the Sick Children's Hospital.

Diseases of the Skin—
W. Allan Jamieson, M.D., Royal Infirmary.
Norman Walker, M.D., Royal Infirmary.

Diseases of the Ear, Nose and Throat—
R. McKenzie Johnston, M.D., Royal Infirmary.
A. Logan Turner, M.D., Surgeons' Hall.
J. Malcolm Farquharson, M.B., New School.

Forensic Medicine—
Professor Sir Henry D. Littlejohn, M.D., University.
Harvey Littlejohn, F.R.C.S., Surgeons' Hall.
W. G. Aitchison Robertson, M.D., New School.

Public Health—
Professor C. Hunter Stewart, M.B., University.
W. G. Aitchison Robertson, M.D., D.Sc., New School.
C. J. Lewis, M.D., D.Sc., Minto House.

Fevers— J. O. Affleck, M.D., City Hospital.
C. B. Ker, M.D., Surgeons' Hall.

Bacteriology—J. M. Beattie, M.D., University.
T. Shennan, M.D., Surgeons' Hall.
J. Taylor Grant, M.D., 4 Lindsay Place.
Stuart M'Donald, M.B., New School.

Diseases of Tropical Climates—
A. Davidson, M.D., University.

Practical Medicine and Physical Diagnosis—
R. W. Philip, M.D., and G. Lovell Gulland, M.D., New School.
R. A. Fleming, M.D., Nicolson Square.
F. D. Boyd, C.M.G., M.D., Surgeons' Hall.

Neurology— J. J. Graham Brown, M.D., New School.

Diseases of the Chest—
R. W. Philip, M.D., 26 Lauriston Place.
G. Lovell Gulland, M.D., 26 Lauriston Place.

Medical Electricity and Röntgen Rays—
Dawson Turner, M.D., Surgeons' Hall.

Practical Gynæcology—
N. T. Brewis, M.D., 5 Cambridge Street.
J. Haig Ferguson, M.D., Leith Hospital.

Diseases of the Blood—
G. Lovell Gulland, M.D., Surgeons' Hall.

Glasgow University

The medical curriculum at the University extends over five years, and the classes are held in the handsome buildings at Gilmorehill, adjacent to which lies the Western Infirmary, where there is an excellent field for clinical and practical work.

The Faculty of Medicine embraces the classes of Botany, Zoology, Physics, Chemistry, Anatomy, Embryology, Physiology, Materia Medica and Therapeutics, Pathology, Medical Jurisprudence and Public Health, Surgery, Clinical Surgery, Practice of Medicine, Clinical Medicine, Midwifery, Insanity, Diseases of the Eye, Diseases of the Ear, Diseases of the Throat and Nose, Diseases of the Skin, and Diseases of Children.

The cost of the medical curriculum is about £126.

Before the commencement of medical and surgical studies the preliminary examination has to be passed. The names of candidates for this examination must be given in and the fee of 10s. 6d. paid to the assistant clerk at the Matriculation Office. At the Matriculation Office successful students can obtain the registration forms, which must be filled up and sent to 48 George Square, Edinburgh.

The University of Glasgow offers many attractions to students. The professional chairs are occupied by able men, some of them of world-wide renown; and in the Western Infirmary, with the recent additions to its surgical theatres and its excellent pathological laboratories and museum, a splendid field of observation is open to the student. There are also extremely good opportunities for practical work in the various dispensaries of the city, in the Maternity Hospital with its large out-door department, and also at the Royal Hospital for Sick Children, the Eye Infirmary, and the Royal Asylum at Gartnavel.

The Students' Union, situated in the University grounds, is very convenient, and much taken advantage of.

Lodgings are to be found all round the neighbourhood, so that the whole life of the student, his work and his recreation, is drawn into a small circle, within which he can move as busily and as profitably to himself as in any teaching school in the kingdom.

A students' magazine is usually issued weekly during the session, and has a successful circulation amongst all the students at Gilmorehill. For medical students there is a Medico-Chirurgical Society for debating purposes.

Queen Margaret College for Women

In February 1892 the Universities Commission issued an ordinance empowering the Scottish University Courts to make provision, within the Universities, for instruction of women. The Council of Queen Margaret College, in consideration of this provision, made over their work to the University. The "Queen Margaret College" survives now as the part of the University which is devoted to the education of women.

A full course of medicine and surgery is obtainable. The regulations, fees, etc., are similar to those for men. The buildings are pleasantly situated in grounds of their own, close to the Botanic Gardens. The newly-built anatomical department is excellently arranged and most complete. Clinical work is amply provided for in the Royal Infirmary and its Dispensaries, and in the Royal Hospital for Sick Children, the Glasgow Maternity Hospital, the Royal Asylum of Gartnavel, and the Belvidere Fever Hospital. There are also arrangements for special study and research.

Students can have board and lodging at Queen Margaret Hall, within easy reach of the College, at the rate of about one guinea per week for each week of the session. The school is

flourishing and largely attended. There is a winter session commencing in October and a summer session in April.

All information necessary can be obtained from Miss Galloway, Queen Margaret College, Glasgow.

St Mungo's College Medical School

86 Castle Street, Glasgow (within the Grounds of the Glasgow Royal Infirmary)

St Mungo's College was the outcome of the Royal Infirmary Medical School which was opened in 1876. The venerable Infirmary has now actively existed for one hundred and six years, and the students of St Mungo have peculiarly good opportunities for practical and clinical work in the wards and dispensaries. To the Royal Infirmary a large number of accidents are admitted, and numerous medical cases of all kinds; and for students, and more especially for house-surgeons and house-physicians, the practical experience is abundant. St Mungo's College buildings are attached to the Dispensary and adjacent to the Infirmary. The winter session opens in October, and there is always a summer session from April to July. All information regarding classes, fees, etc., can be obtained from the Dean, St Mungo's College, 86 Castle Street. The classes are for male students only. The class-rooms and laboratories have accommodation for 300 or 400 students. The anatomical department consists of large, well-lighted dissecting-rooms, a lecture-room, and osteology gallery and museum. There are also chemical, physiological, zoological, and botanical laboratories. In the adjacent dispensaries fully 40,000 patients are seen yearly. Students can also have access to the well-equipped Pathological Museum and Laboratory of the Infirmary, and the bacteriological department.

The electrical department of the hospital is one of the best in the country, while a complete Electric Light installation, including a powerful educational lantern, was added to the equipment of the College during the past session.

The bursaries are few in number, but the class fees are moderate, averaging two guineas for a winter course, while the combined theoretical and practical courses of anatomy, zoology, physiology and pathology are four guineas each.

A Public Health Laboratory is also open to students for a complete course in practical work, and there are two lectureships on this subject, so that those who desire may conform to the new regulations of the Medical Council and the requirements of

the examining board. Excellent instruction in fevers can be obtained at Ruchill and Belvidere Hospitals. Dressers and clerks are chosen from the students for work in the wards of the Infirmary. The close proximity of the Maternity Hospital, Rottenrow, affords excellent opportunities for clinical demonstrations, which form a considerable and unique addition to the ordinary course of systematic instruction in midwifery.

LECTURES AND DEMONSTRATIONS.

WINTER SESSION.

Elementary Physics—Professor Blyth.
Chemistry—Professor A. W. C. Menzies.
Zoology—Professor King.
Practical Zoology—Professor King.
Senior Anatomy—Professor Alex. Macphail.
Junior Anatomy—Professor Alex. Macphail.
Practical Anatomy—Professor Alex. Macphail.
Surgery—Professor Henry E. Clark.
Physiology—Professor Farquharson.
Clinical Surgery—Professor D. N. Knox.
Practice of Medicine—Professor T. K. Monro.
Clinical Medicine—Professor D. C. M'Vail.
Materia Medica—Professor Dougall.
Pathology—Professor Workman.
Midwifery—Professor Robert Jardine.
Ophthalmology—Professor Maitland Ramsay.
Gynæcology—Dr James K. Kelly.
Throat and Nose—Dr Fullerton.
Public Health Laboratory—Professor Galt.
Public Health—Professor Galt.

Bacteriology, if desired. *Hospital Dispensary*, daily.

SUMMER SESSION.

Practical Pathology—Professor Workman.
Botany—Professor Jas. Swanson.
Practical Botany—Professor Jas. Swanson.
Practical Chemistry—Professor A. W. C. Menzies.
Practical Physiology—Professor Farquharson.
Clinical Surgery—Professor D. N. Knox.
Operative Surgery—Professor Henry E. Clark.
Surgical Diseases of Children—Dr James A. Adams.
Clinical Medicine—Professor D. C. M'Vail.
Anatomy—Professor Alex. Macphail.

Demonstrations—Professor Alex. Macphail.
Practical Anatomy—Professor Alex. Macphail.
Osteology—Professor Alex. Macphail.
Forensic Medicine and Hygiene—Professor Galt.
Dermatology—Dr Alex. Morton.
Otology—Dr J. Kerr Love.
Bacteriology—Dr David M'Crorie.
Psychological Medicine—Dr Hamilton C. Marr.
Hospital Dispensary, daily.

Anderson's College Medical School

Dumbarton Road, Partick, Glasgow

The old institution known as "Anderson's University" was founded by John Anderson, M.A., F.R.S., in 1726, and the medical school connected therewith dates back to the year 1800.

In 1877 the name of the Institution was altered from "Anderson's University" to "Anderson's College." In 1887 the medical school of Anderson's College became a distinct Institution known as "Anderson's College Medical School."

The new buildings are situated in Dumbarton Road, immediately to the west of the entrance of the Western Infirmary, and four minutes' walk from the University. They are constructed on the best modern principles, and are provided with all the appliances requisite for the conduct and management of a fully equipped medical school.

Classes are conducted in all the subjects of the five years' curriculum :—

Anatomy—Professor A. M. Buchanan, M.A., M.D.
Physics—Professor Peter Bennett.
Chemistry—Professor J. Robertson Watson, M.A.
Botany—Professor B. G. Cormack, M.A., B.Sc.
Zoology—Professor Geo. Bell Todd, M.B.
Physiology—Professor Robert Fullarton, M.A., M.B.
Materia Medica—Professor R. Barclay Ness, M.A., M.B.
Medical Jurisprudence and Hygiene—Professor Carstairs Douglas, B.Sc., M.D., F.R.S.E.
Midwifery—Professor John Edgar, M.A., B.Sc., M.B.
Surgery—Professor J. H. Nicoll, M.B.
Practice of Medicine—Professor R. S. Thomson, M.D., D.Sc., F.R.S.E.
Ophthalmic Medicine and Surgery—T. Spence Meighan, M.B.

Aural Surgery—James Galbraith Connal, M.B.
Diseases of Throat and Nose—John Macintyre, M.B., F.R.S.E.
Mental Diseases—John Carswell, F.F.P.S.G.
Public Health Laboratory—Professor Carstairs Douglas, B.Sc., M.D., F.R.S.E.
Pathology—At the Western or Royal Infirmary.

Degrees and diplomas.—Certificates of attendance on the classes at Anderson's College Medical School are received by the Universities of London and Durham, by the Royal University of Ireland, and by all the Royal Colleges and Licensing Boards in the United Kingdom. They are also recognised by the Universities of Glasgow and Edinburgh under certain conditions which are stated in the calendar of this school.

Candidates for the Licence in Dental Surgery can obtain at this school the full medical curriculum which is required. The courses special to dentistry are conducted at the Glasgow Dental School, 15 Dalhousie Street.

Malcolm Kerr Bursary in anatomy. Value about £10. Open to students of the junior anatomy class during session 1904-1905.

The Carnegie Trust will pay the fees of students at Anderson's, on conditions, regarding which particulars may be obtained from W. S. M'Cormick, LL.D., Carnegie Trust Offices, Edinburgh.

Class fees.—For each course of lectures (anatomy, ophthalmic medicine and surgery, aural surgery, diseases of throat and nose and mental diseases excepted): first session, £2, 2s.; second session (in Anderson's College), £1, 1s.; afterwards free. For practical classes (except anatomy), viz., chemistry, botany, zoology, physiology, pharmacy, operative surgery: first session, £2, 2s.; second session, £2, 2s.

Reduced joint fees in zoology and in botany, for lectures and practical class when taken in same summer session, £3, 3s.; for either course separately, £2, 2s.

Anatomy class fees.—Winter—first session (including practical anatomy), £4, 4s.; second session (including practical anatomy), £4, 4s.; third session, £2, 2s.

Summer—lectures and practical anatomy, £2, 12s. 6d.; lectures alone, £1, 11s. 6d.; practical anatomy alone, £1, 11s. 6d.; osteology and practical anatomy, £2, 12s. 6d.; osteology alone, £1, 11s. 6d.; practical anatomy alone, £1, 11s. 6d.

Ophthalmic medicine and surgery (including hospital practice), *Aural surgery, Diseases of throat and nose, and Mental diseases*, £1, 1s.

Matriculation fee.—Winter, 10s. to those taking out two or

more classes; 5s. to those taking out one class only. The matriculation fee of 10s. represents a combined fee for the winter and summer sessions. Summer, 5s., except to those who have paid a fee of 10s. for winter session.

Western or Royal Infirmary.—Fees: Hospital practice and clinical instruction: first year, £10, 10s.; second year, £10, 10s., afterwards free. Six months, £7, 7s. at Western Infirmary; £6, 6s. at Royal Infirmary; three months, £4, 4s. Vaccination fee, £1, 1s. Pathology at Western Infirmary, £3, 3s. Practical pathology, £3, 3s.; at Royal Infirmary, both courses, £4, 4s. Attendance at the dispensaries of the Western and Royal Infirmaries is included in the hospital fees.

A calendar may be obtained from the secretary, Dr R. Barclay Ness, Anderson's College Medical School, Dumbarton Road, Partick, Glasgow.

Aberdeen University.

The course of study for the degree of M.B., Ch.B., extends over five years, of which two at least must be spent in the University of Aberdeen.

The curriculum is the same as in the other Scottish Universities as far as relates to attendance on University classes, to clinical study at a General Hospital, to attendance on courses of Clinical Surgery, Clinical Medicine, Mental Diseases, and Practical Pharmacy, to instruction in Vaccination, to attendance on Cases of Labour, and to the practice of a Dispensary.

The candidate must also, before admission to the final examination, produce the following certificates:—

(1) That he has acted as clerk in the Medical and Dresser in the Surgical Wards of a Public Hospital, each for a period equivalent to one Winter Session.

(2) That he has been present at not fewer than twenty-five post-mortem examinations at a Hospital or Dispensary, some of which he must have taken part in performing.

(3) That he has attended for at least three months the practice of a General Fever Hospital with not fewer than forty beds.

(4) That he has attended for at least three months a course of clinical instruction in the Diseases of Children.

(5) That he has attended for at least three months the Ophthalmological practice of a Hospital or Dispensary, where special provision is made for giving instruction.

Certificates for these various classes and courses must attest not only regular attendance, but also due performance of the work.

There is no prescribed order of study, but a scheme, representing the minimum curriculum, has been drawn up for the guidance of students, and is printed in the Calendar.

The following are the Classes in the Medical Faculty:—

WINTER SESSION.

Zoology—Professor John Arthur Thomson, M.A.
Chemistry—Professor Japp, M.A., LL.D., F.R.S.
Anatomy—Professor Reid, M.D., F.R.C.S.
Practical Anatomy—Professor Reid and Assistants.
Physiology (*Syst. and Pract.*)—Professor MacWilliam, M.D.
Materia Medica—Professor Cash, M.D., F.R.S.
Pathology (*Syst. and Pract.*) — Professor Hamilton, M.B., F.R.C.S.., F.R.S.E.
Surgery—Professor Ogston, C.M., M.D.
Medicine—Professor Finlay, B.A., M.D., F.R.C.P. Lond.
Midwifery and Diseases of Women and Children—Professor Stephenson, M.D., F.R.C.S.

SUMMER SESSION.

Botany—Professor Trail, M.A., M.D., F.L.S., F.R.S.
Practical Botany—Professor Trail.
Zoology—Professor Thomson.
Practical Zoology—Professor Thomson.
Physics—Professor Niven, M.A., D.Sc., F.R.S.
Practical Chemistry—Professor Japp and Assistants.
Practical Anatomy—Professor Reid and Assistants.
Practical Materia Medica and Pharmacy—Professor Cash and Assistants.
Physiology (*Syst. and Pract.*)—Professor MacWilliam.
Forensic Medicine—Professor Hay, M.D.
Practical Hygiene and Forensic Medicine—Professor Hay.
Pathology (*Syst. and Pract.*)—Professor Hamilton.
Practical Midwifery and Gynæcology and Clinical Diseases of Children—Professor Stephenson.
Tropical Medicine—Dr G. A. Maconachie, Lecturer.

Systematic and Practical Pathology, and Systematic and Practical Physiology respectively are now taught as part of one continuous course, occupying a whole academic year, *i.e.* a summer and a winter session.

There are Assistants to the Professors in the Medical Faculty appointed annually, two in the department of Anatomy,

Physiology, Materia Medica, and Chemistry, and one in each of the other departments.

The following are recognised as Lecturers—

Lecturer on	Mental Diseases .	Wm. Reid, M.D.
„	Ophthalmology . .	C. H. Usher, M.B., B.S., F.R.C.S.
„	Vaccination . .	R. G. M'Kerron, M.A., M.D.
„	Skin Diseases . .	J. F. Christie, M.A., M.B., C.M.
„	Diseases of Ear, Throat, and Nose . .	J. Mackenzie Booth, M.D., C.M.
„	Ophthalmology . .	A. Rudolph Galloway, M.A., M.B., C.M.

All the University Classes are held at Marischal College.

Tutorial Classes are held in connection with most of the Systematic Courses, and practical instruction is given in the fully-equipped Laboratories connected with the several departments.

Graduates or others desirous of engaging in special study or research may be allowed by the Senatus to work in any of the Laboratories. Such Research Students are exempted from payment of Laboratory Fees (*v. infra*), but must matriculate each year, paying the ordinary Matriculation Fee.

Fees for Ordinary Laboratory Course—

For six hours a week (winter session) .	£3	3	0
Each additional hour . . .	0	10	6
For nine hours a week (summer session)	3	3	0
Each additional hour . . .	0	7	0
Or, For one month (all day) . . .	4	4	0
„ two months („) . . .	7	7	0
„ three „ („) . . .	10	10	0

The Matriculation Fee must be paid in addition.

General clinical instruction is obtained in the following Medical Institutions:—

The Royal Infirmary of Aberdeen.

This General Hospital, situated about seven minutes' walk from Marischal College, has been recently constructed on the most modern principles, and is fully equipped with all the requirements for medical work and teaching. It accommodates upwards of two hundred patients; the number of patients admitted during the year 1903 was 2743, and the number of out-patients treated during the same period was 10,699.

Four resident medical officers are appointed annually, two in May and two in August, from those who have completed their medical course, to hold office for twelve months. Salary, £25 with board.

Fees.—Perpetual fee to hospital practice, £6, or first year £3, 10s., second year £3, afterwards free; clerkship in medicine, £1, 1s.; dressership in surgery, £1, 1s.; pathological demonstrations, £2, 2s. (Special courses of lectures are charged for.)

Royal Hospital for Sick Children.

It is situated about five minutes' walk from Marischal College.

It accommodates over 80 patients. The number of patients admitted in 1903 was 767, and the number of out-patients treated 1374. No infectious disease except diphtheria is treated.

Each student must act as clerk for six weeks in the medical and surgical wards respectively.

There is one qualified house physician and surgeon (resident) who holds office for six months. Salary at the rate of £25 per annum.

Fee for hospital practice, £2, 2s. first year; subsequent years, £1, 1s.

Royal Asylum.

It is situated about fifteen minutes' walk from Marischal College. It accommodates over 950 patients, and has been recently fitted up with a fully equipped hospital and a laboratory.

The senior physician is recognised by the University as lecturer on mental diseases, and delivers a qualifying course of lectures.

The City (Fever) Hospital.

It is situated about ten minutes' walk from Marischal College, and accommodates 100 patients.

Senior students are admitted for instruction in fevers twice a week under the visiting physician (who is the Medical Officer of Health for the City) and his assistant. Fee, £1, 1s.

There is one qualified resident house physician appointed annually. Salary, £50 and board.

General Dispensary, Maternity Hospital, and Vaccine Institution.

It is situated about five minutes' walk from Marischal College.

The total number of cases treated during 1903 was 12,127, and the number of patients treated at their own homes, 3102. There were 336 midwifery cases.

Fees.—Perpetual Fee, £3, 3s.; vaccination certificate and instruction, £1, 1s.; for special courses, *v. supra.*

Ophthalmic Institution.

This institution is situated about three minutes' walk from Marischal College. The surgeon in charge is recognised by the University as a lecturer on ophthalmology.

During 1903, 50 in-patients and 3680 out-patients were treated.

PROFESSIONAL EXAMINATIONS.

I. DEGREES OF M.B., Ch.B.

There are four examinations: the subjects and regulations of these are common to all the Scottish Universities.

II. DEGREE OF M.D.

The regulations are common to all the Scottish Universities.

The candidates must be M.B., Ch.B. of Aberdeen University, and twenty-four years of age or upwards.

He must submit a thesis composed by himself, and pass an examination in clinical medicine.

The following are special regulations with regard to the clinical examination:—

The examination is both written and oral, and consists of the following divisions:—

Part I. (*a*) A written report on one or more clinical cases examined by the candidate.

(*b*) An oral and practical examination at the bedside. Candidates must be able to use the laryngoscope and ophthalmoscope, so far as they are required in medical cases.

Part II. The candidates must show a high proficiency in a special department selected by himself, *e.g.* Obstetrics, Mental Diseases, Zymotic Diseases, or other departments approved by the Senatus.

Part III. A commentary in writing on a case or cases, a statement of the particulars of which will be submitted to the candidate.

(For dates of submission of thesis, payment of fees, etc., *v.* degree of C.M.)

III. DEGREE OF C.M.

The regulations are common to all the Scottish Universities.

The candidate must be M.B., Ch.B. of Aberdeen University, and twenty-four years of age or upwards.

He must submit a thesis composed by himself, and pass an

examination, of which the following are the special regulations:—

The examination is written, oral, and practical, and consists of the following divisions:—

Part I. (*a*) A written report on one or more clinical cases examined by the candidate.

(*b*) An oral and practical examination on cases. Candidates must be familiar with the use of instruments required in investigating diseases of the eye, ear, and throat.

Part II. An examination in surgical anatomy and operations on the cadaver.

Each candidate for the degree of C.M. or M.D. must lodge his thesis (accompanied by a signed declaration that the work has been done and the thesis composed by himself) with the Dean of the Faculty of Medicine not later than 1st February for the spring graduation, or 1st June for the summer graduation. He shall at the same time intimate the special department of clinical examination (M.D.) for which he wishes to enter, and pay the necessary fee.

The fee for the degree of M.D. or C.M. is £10, 10s. (exclusive of any stamp duty); re-examination fee is £2, 2s.

IV. Diploma in Public Health (D.P.H.).

The diploma is conferred, after special instruction and examination, on anyone who has been at least twelve months a graduate in medicine of a university in the United Kingdom; if not a graduate of Aberdeen University, the candidate must attend a course of instruction in this University in one or more subjects embraced in the examination for the diploma.

Each candidate must have attended a course of instruction in Public Health.

The qualifying post-graduate instruction embraces:—

(*α*) Regular attendance, for three months, at a hospital for infectious diseases, at which opportunities are afforded for the study of methods of administration.

(*β*) Daily association for a period of six months (of which at least three months must be distinct from the period of laboratory instruction) in the duty, routine and special, of Public Health Administration, under the supervision of a recognised Medical Officer of Health.

(*γ*) Practical instruction, for at least six months, in laboratory work, which includes examination of water, air,

soil and foods, and the study of bacteriology, disinfection, ventilation, water supply and sewerage, and the framing of reports of analysis. The laboratory attendance must extend over at least fifteen hours a week.

The qualifying courses of laboratory instruction in Aberdeen University are given in the Public Health Laboratory (Fee, £6, 6s.), and the Bacteriological Laboratory (Fee, £4, 4s.).

The Diploma is conferred after an examination in March and July of each year.

The examination is written, oral and practical, and is divided into two parts.

Part I. embraces the following subjects in their application to Public Health:—

(α) Physics, Engineering, and Meteorology.
(β) Chemistry, Microscopy, and Bacteriology.

Part II. embraces:—

(α) General Hygiene.
(β) Sanitary Law and Vital Statistics.

Part I. may be taken alone, or both parts together.

The written examinations occupy two days, and the oral and laboratory and outdoor examination three to four days.

Candidates must send in their names and pay the fees a fortnight before the examination. Examination fee is five guineas. Re-examination fee one guinea.

SUMMARY OF FEES.

I. University Fees.

		£	s.	d.
(α) Preliminary Examination (each occasion)		0	10	6
(β) Matriculation—For whole year		1	1	0
For Summer Session		0	10	6
(γ) Class Fees—				
Each Systematic Course—For Winter or Full Course		4	4	0
Each subsequent attendance		3	3	0
For Summer or Half-Course		3	3	0
Each subsequent attendance		3	3	0
Each Practical Course and subsequent attendance		3	3	0
Except { Practical Anatomy in Summer		2	2	0
Except { Practical Midwifery		2	2	0

(δ) Degree Fees—For M.B., Ch.B.—			
1st Professional Exam.	£5 5 0		
2nd " "	5 5 0		
3rd " "	5 5 0		
4th " "	7 7 0		
		£23	2 0
Re-examination fee for not more than two subjects		1	1 0
" for each additional subject		0	10 6
For M.D.		10	10 0
For Ch.M.		10	10 0
Re-examination Fee		2	2 0

II. NON-UNIVERSITY FEES.

Royal Infirmary—Perpetual Fee		6	0 0
Children's Hospital		2	2 0
Dispensary—Perpetual Fee		3	3 0
City (Fever) Hospital		1	1 0
Lectures on clinical medicine—Winter Session		4	4 0
" " " Summer "		3	3 0
" clinical surgery—Winter Session		4	4 0
" " " Summer "		3	3 0
Clerkship at Royal Infirmary		1	1 0
Dressership " "		1	1 0
Course of Lectures on { Mental diseases; Tropical Medicine; Diseases of eye; Diseases of ear and throat; Diseases of skin }	Each	2	2 0
Instruction in { Clinical gynæcology; Medical electricity; Anæsthetics; Dental surgery; Post-mortem room }			
Instruction in Vaccination		1	1 0

The cost of matriculation, class and hospital fees for the whole curriculum, exclusive of fees for degrees, is usually about £120.

University of St Andrews

The medical degrees are the same as those of the other Scottish universities, and they are granted under similar conditions. The graduation fees for the degree of M.B., Ch.B., amount to twenty-two guineas and for M.D. or Ch.M. ten guineas.

United College, St Andrews, affords considerable facilities

to students beginning a medical course, especially if they are willing to combine it with a preliminary two years of study for an Arts or Science degree. Under the new regulations, which make it possible to study botany, zoology, chemistry and physics as part of the course for an M.A. degree, the medical student can, during the early years of his medical course, hold some of the many bursaries or scholarships which the University of St Andrews has to offer. For women the large number of Taylour Thomson bursaries, to which female medical students have a preference, makes the course in St Andrews specially advantageous. There are several £20 bursaries for men. The cost of rooms and living is considerably under that in the larger towns. For women there is an excellent residential hall, and other students may attend the common dinners in the Union. The medical course in St Andrews extends over two years, and embraces all the subjects of the first two professional examinations. The other subjects must be studied elsewhere, but the student may take all the examinations in the University, and graduate there. There are special buildings for the Medical School.

University College, Dundee, supplies a complete course of medical study, whether the student graduate at the University (St Andrews) or not. Several bursaries are offered for competition among the medical students. Large and commodious new buildings for this medical school will be ready for occupation this month. Besides that supervision of individual students which larger schools cannot offer, there are unrivalled opportunities for clinical and out-patient work in the Royal Infirmary. Already this institution is provided with over 300 beds, including special wards for obstetrics, gynæcology, children's diseases, ophthalmology, and other special departments.

In addition to this, a large building is in process of construction, which will provide an additional 120 beds and quarters for special research. There is a large outdoor maternity department, and there are dispensaries which are largely attended in the various districts of the city.

The large asylum at Liff provides material for instruction in mental diseases, and the epidemic hospital for that in fevers. There is also the Royal Victoria Hospital where patients suffering from incurable diseases can be visited.

The classes at the United College, St Andrews, are:— Natural philosophy; practical physics; chemistry; practical chemistry; natural history; practical zoology (when taken along with the ordinary classes the fee for each of these three practical classes is £1, 1s.); botany; practical botany; physiology; anatomy; practical anatomy; materia medica; practical materia medica.

ST ANDREWS.

PROFESSORS AND LECTURERS.

Physics —Professor Butler
Chemistry— Professor Purdie.
Zoology— Professor Mackintosh.
Botany Lecturer—
Mr R. A. Robertson.
Physiology—Dr Harris.
Anatomy Lecturer—
Professor Musgrove.
Materia Medica—
Professor Marshall.

At University College, Dundee, full courses in medicine and in public health are given as follows:—

DUNDEE UNIVERSITY COLLEGE.

PROFESSORS AND LECTURERS.

Physics— Professor Kuenen.
Chemistry— Professor Walker.
Zoology— Professor D'Arcy Thompson, C.B.
Botany— Professor Geddes.
Physiology—Professor Waymouth Reid.
Anatomy— Principal Yule Mackay.
Surgery, Systematic and Operative—
Professor MacEwan.
Surgery, Clinical—
Professor MacEwan.
Mr D. M. Greig.
Medicine, Systematic—
Professor Stalker.
Medicine, Clinical—
Professor Stalker.
Dr Mackie Whyte.
Materia Medica—
Professor Marshall.
Pathology— Professor Sutherland.
Midwifery and Diseases of Women—
Professor Kynoch.
Midwifery and Diseases of Women, Clinical—
Professor Kynoch.
Dr R. C. Buist.
Forensic Medicine—
C. Templeman, M.D., D.Sc., M.O.H.
Ophthalmology—
A. M'Gillivray, M.D.

Mental Diseases—
J. Rorie, M.D.
Diseases of Ear and Throat—
G. T. Guild, M.B.
Vaccination—
R. C. Buist, M.D.

Qualifications given by the Scottish Colleges

The Royal College of Physicians of Edinburgh, The Royal College of Surgeons of Edinburgh, and the Faculty of Physicians and Surgeons of Glasgow, conjointly confer the Triple Qualification (L.R.C.P.E., L.R.C.S.E., L.F.P.S.G.). Female candidates are admitted to the examinations for this qualification, the Regulations being the same for candidates of either sex.

PRELIMINARY EXAMINATION.—This examination must be passed before the Student commences professional study. It may be passed before any of the Boards recognised by the General Medical Council, and enumerated in the Regulations of the Colleges. The Educational Institute of Scotland conducts a qualifying Preliminary examination for medical students, in Edinburgh and Glasgow, on behalf of the Colleges. This examination embraces English, Latin, Mathematics, and either Greek, French, German, Italian, or other modern language. All the subjects must be passed at one time. Further particulars are obtainable from S. M. Murray, Esq., 40 Princes Street, Edinburgh, or from Hugh Dickie, Esq., LL.D., Secretary to the Board of Examiners, The Academy, Kilmarnock.

REGISTRATION.—This is essential; the Regulations have been already given.

PROFESSIONAL EDUCATION.—The curriculum must extend over five years. Graduates in Art or Science of any recognised University who have spent a year in the study of Physics, Chemistry and Biology, and have passed an examination in these subjects for the degrees in question, are exempted from the first year of study. The fifth year of study should be devoted to clinical work in one or more recognised Hospitals or Dispensaries, and to the study of special diseases; but the student may pass six months of the fifth year as a pupil to a registered practitioner deemed capable by the committee of management. For information regarding the payment of class fees by the Carnegie Trust, *vide* p. 306.

ORDER OF STUDY WHICH IS RECOMMENDED.

First Summer— Physics and Elementary Biology.

First Winter.— Five months' course in Chemistry and Anatomy; three months' course in Practical Chemistry; Practical Anatomy.

Second Summer.—Practical Anatomy; Histology.

Second Winter.— Practical Anatomy; Physiology—Five months' course.

Third Summer.— Three months' course in Pathology, Materia Medica, and Practical Materia Medica; Surgical Hospital Practice.

Third Winter.— Six months' course in Surgery and Clinical Surgery; Attendance at Surgical Wards.

Fourth Summer.—Three months' course in Midwifery and Gynæcology, in Medical Jurisprudence and Public Health, and in Clinical Surgery; Hospital Practice.

Fourth Winter.— Six months' course in Medicine and Clinical Medicine; Hospital Practice.

Fifth Summer.— Three months at Clinical Medicine; Hospital; Insanity; Diseases of Children; Diseases of Eye.

Practical Midwifery—Personal attendance on twelve cases under the supervision of a medical practitioner, *or* three months' attendance at a Lying-in Hospital and personal attendance on six cases.

Fifth Winter.— Hospital Practice; Fevers; Dispensary; Vaccination; Skin Diseases; Ear and Throat Diseases.

PROFESSIONAL EXAMINATIONS.—Four of these are held during the curriculum. Each is held quarterly in Edinburgh and twice a year in Glasgow. Candidates may go up for all the subjects of the first Professional examination at once, or may enter for and pass in any division of subjects. A higher percentage of marks is required, however, from candidates entering for such divisions. Candidates are advised to enter for the entire examination; they must enter for *all* the subjects of the second, third, and final examinations.

First Examination.— Physics, Chemistry, and Elementary Biology. This should be passed before the beginning of the second winter session.

Second Examination.—Anatomy, Physiology, including Histology. This should be passed at the end of the second year of study.

Third Examination.— Pathology, Materia Medica, and Pharmacy. This should be taken at the end of the third year.

Final Examination.— Can only be taken at the end of the fifth year. The candidate must have attained the age of twenty-one.

It includes :—

1. Medicine, Therapeutics, Medical Anatomy, Clinical Medicine.
2. Surgery, Surgical Anatomy, Clinical Surgery, Diseases of the Eye.
3. Midwifery and Diseases of Women and New-born Children.
4. Medical Jurisprudence nnd Public Health.

Fees for Professional Examinations.

For each of the first three, £5 ; for the final, £15. The minimum total expense, inclusive of fees for classes and examinations, amounts to £115.

Diploma in Public Health of the Royal Colleges.

The Diploma is granted by the Triple Qualification Board.

1. Every candidate for examination must have held a registrable medical qualification for one year.

2. After obtaining such qualification, he must have attended during six months a recognised Laboratory in which Chemistry, Bacteriology, and the Pathology of the Diseases of Animals transmissible to man are taught ; and the certificate must show that the candidate has conducted analyses of air, water, sewage, and foods.

3. After obtaining a medical qualification he must during six months have been engaged in acquiring a practical knowledge of the duties of Public Health Administration, under the supervision of—

(*a*) In England or Wales, the Medical Officer of Health of a County or single sanitary District having a population of not less than 50,000, or a Medical Officer of Health devoting his whole time to Public Health work ; or

(*b*) In Scotland or Ireland the Medical Officer of Health of a County or District or Districts with a population of not less than 30,000; or

(*c*) A Medical Officer of Health who is also a teacher in the Department of Public Health in a recognised medical school.

(*d*) A Sanitary Staff Officer of the Royal Army Medical Corps having charge of an Army Corps, District, or Command, recognised for the purpose by the General Medical Council.

4. After obtaining a medical qualification he must have attended for three months the practice of a Hospital for Infectious Diseases.

There are *Two Examinations*. The first includes—(*a*) Laboratory work, with Chemistry and Bacteriology; (*b*) Physics; (*c*) Meteorology.

The Second Examination embraces—(*a*) Report on premises visited; (*b*) Examination at Fever Hospital; (*c*) Examination at Public Abattoir; (*d*) Epidemiology and Endemiology; (*e*) Vital Statistics and Sanitary Law; (*f*) Practical Sanitation.

Each examination is held bi-annually, in October and May. The fee for each is £6, 6s.; for re-examination, £3, 3s. Fees and applications to be lodged with Mr JAMES ROBERTSON, 54 George Square, Edinburgh; or with Mr ALEX. DUNCAN, LL.D., 242 St Vincent Street, Glasgow.

MEMBERSHIP AND FELLOWSHIP OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH.

Every applicant for the *Membership* must possess a recognised qualification, and be not less than twenty-four years of age. He must pass an examination on Medicine and Therapeutics, on Clinical Medicine, and on some special Department of Medicine, such as Psychological Medicine, Pathology, Medical Jurisprudence, Public Health, Midwifery, Gynæcology, Neurology, Diseases of Children, Tropical Medicine, etc.. Having passed this examination the Membership is conferred by election.

The fee for the Membership is thirty-five guineas, except the applicant be a Licentiate of the College, when it is twenty guineas.

Members of not less than three years' standing may be raised by election to the *Fellowship*, the fee being thirty-eight guineas, exclusive of Stamp Duty of £25.

Fellowship of the Royal College of Surgeons, Edinburgh.

Every candidate must be twenty-five years of age, and must have been engaged for two years in the practice of his profession after having obtained a recognised qualification in Surgery. The petition for examination must be signed by two Fellows—a proposer and seconder.

The candidate must pass an examination on Surgery, Surgical Anatomy, Operative and Clinical Surgery, and one optional subject, for example, Ophthalmology, Aural, Nasal and Laryngeal Surgery, Cerebro-Spinal, Abdominal, Gynæcological, Orthopædic, Dental, Venereal and Genito-Urinary Surgery, Advanced Anatomy or Physiology, Surgical Pathology and Morbid Anatomy, Midwifery, Gynæcology, Medical Jurisprudence and Public Health.

The fees amount to £45. If the candidate be a Licentiate of the College the fee is £30. Further particulars may be obtained from Mr James Robertson, Clerk to the College, 54 George Square, Edinburgh.

Fellowship of the Faculty of Physicians and Surgeons of Glasgow.

Every candidate must have been qualified for two years, and be aged twenty-four. Admission to the Fellowhip is by examination and subsequent election. The candidate is examined on either (*a*) Medicine (including Clinical Medicine, Medical Pathology, and Therapeutics), or (*b*) Surgery (including Clinical Surgery, Operative Surgery, Surgical Anatomy, and Surgical Pathology); and on one optional subject—Anatomy, Physiology, Pathology, Midwifery, Diseases of Women, Medical Jurisprudence, Ophthalmic Surgery, Aural, Laryngeal and Nasal Surgery, Dental Surgery, State Medicine, Psychological Medicine or Dermatology.

The fee is £30, except the candidate be a Licentiate of the Faculty, when it is £15.

Medical Education of Women in Edinburgh

Medical College for Women, Minto House.

This College is recognised by the University Court and the Triple Qualification Board as a Medical School, whose courses of instruction qualify for graduation in Medicine. The curriculum and class fees are the same as for male students

proceeding to the University Degree or College Qualification respectively. Clinical tuition is provided in the Royal Infirmary,

The prospectus of the College, and any information regarding the medical education of women in Edinburgh, may be obtained from Miss MACKAY, Secretary, Medical College for Women, Minto House, Edinburgh, who will be glad to furnish lists of lodgings to intending students.

Post-Graduation Study

The Scottish Medical Schools afford at present few facilities for post-graduation study as compared with London and some of the Medical Schools on the Continent.

LONDON.—In the various special hospitals the graduate will find excellent opportunity for the study of the special branches of medicine and surgery. We may also mention :—

The London Medical Graduates' College and Polyclinic, 22 Chenies Street, Gower Street, London, W.C. Here there are class-rooms, laboratory for bacteriological and chemical pathology, dark room for ophthalmoscopy, reading room, museum, etc. Information regarding the classes and fees may be obtained from the Medical Superintendent, A. E. Hayward Pinch, Esq., F.R.C.S.

The London Post-Graduate Association, which issues cards of admission to the clinical instruction, out-patient departments, operations and necropsies in the following hospitals :—Charing Cross ; Middlesex ; St Thomas's ; Guy's ; St Bartholomew's; University College ; King's College ; St George's ; Westminster; London ; St Mary's ; The Brompton Hospital for Diseases of the Chest ; The Royal Hospital for Sick Children, Great Ormond Street ; The London School of Tropical Medicine; The National Hospital for the Paralysed and Epileptic, Queen's Square ; and the Royal London ("Moorfields") Hospital. The fee for a three months ticket is seven guineas, for six months ten guineas. Further particulars may be obtained from the Secretary, London Post-Graduate Association, Examination Hall, Victoria Embankment, London, W.C.

West London Post-Graduate College : West London Hospital. —The clinical material of the Hospital, containing 159 beds, is devoted to post-graduation study. Instruction is also given in the various clinical departments and in the pathological laboratory, and classes are held on special subjects. The prospectus may be obtained from the Dean of the College.

North-East London Post-Graduate College is in connection

with the Tottenham Hospital. Cliniques, lectures and demonstrations are given, and study may be commenced at any time. Further information may be obtained from the Dean of the College, S. A. J. Whiting, 142 Harley Street, W.

In PARIS, graduates will find abundant facility for study. Holiday classes are held in September and October (*vide* the September number of the *Journal*, p. 228). Those who propose to study in Paris should consult "An English Handbook to the Paris Medical School," by A. A. Warden, M.D., which gives information regarding the general and special hospitals, professors, lecturers, institutes, museums, etc.

VIENNA.—Post-graduate classes are held in Vienna all through the year. Each class lasts four weeks, the fee for each being usually about two guineas.

More classes are held in August and September than during the session. In August of this year there were at least sixty, and in September over sixty different classes, including those on serotherapy, bacteriology, physiological and pathological chemistry, urine analysis, diseases of the stomach and intestines, neurology, mental diseases, orthopedic surgery, laryngology, cystoscopy and syphilis. Information regarding the classes can be obtained from the Dean of the Medical Faculty.

BERLIN.—Numerous post-graduate classes are likewise held in Berlin, and as in Vienna each course lasts four weeks. More classes are obtainable in October than during the summer months. For details of the classes the graduate should apply to Herr Anders, Langenbeck Haus, Ziegelstrasse, Berlin; or to Die Medicinische-Buchhandlung, Otto Enslin, Karl Strasse 32, Berlin, N.W.

Post-graduate courses are also held in Munich, Hamburg (last week of September and first fortnight of October), Würzburg (classes commence early in September and last five weeks), Erlangen, Freiburg in Breisgau, and in other medical schools in Germany.

THE ROYAL NAVY MEDICAL SERVICE

A CANDIDATE must be between 21 and 28 years of age. He must declare: (1) his age, and date and place of birth; (2) that he is of pure European descent, the son either of natural born British subjects or of parents naturalised in the United Kingdom; (3) that he labours under no mental or constitutional weakness; (4) that he is ready to engage for general service at home or abroad; (5) that he is registered under the Medical Acts as duly qualified professionally, and

what diplomas, etc., he holds. Copies of the Regulations for the entry of candidates for commissions will be furnished on application to the Medical Director-General, Admiralty, 18 Victoria Street, London, S.W.

The entrance examination consists of two parts. Part I.—*Compulsory*—(*a*) Medicine (including Materia Medica, Therapeutics, and Hygiene), 1200 marks; (*b*) Surgery, 1200 marks. Part II.—*Voluntary*—consisting of two divisions: (*a*) French and German (300 marks each); (*b*) Natural Sciences—not more than two of the following subjects—Zoology, Botany, Chemistry, Physiology, Geology, and Physical Geography (300 marks each).

Successful candidates, immediately after passing this examination, will receive commissions as surgeons in the Royal Navy, and will undergo a course of practical instruction in Naval Hygiene, the diseases of warm climates, etc., at Haslar Hospital.

Full Pay (yearly)—Surgeon (on entry), £255, 10s.; after four years' full-pay service, £310, 5s.; after eight years' full-pay service, or on promotion to Staff-surgeon, £365; after twelve years' service, £438; Fleet-surgeons (on promotion), £492, 15s.; after four years' full-pay service in that rank, £547, 10s.; after eight years' full-pay service, £602, 5s.; after twelve years' service, £657; Deputy Inspector-General, £766, 10s.; Inspector-General, £1300.

Allowances.—The senior medical officer of ships bearing the flags of flag officers commanding foreign stations and the Channel receives an allowance of 5s. a day. An allowance of 2s. 6d. a day may be granted to the senior medical officer of ships bearing the flag of flag officers not commanding stations or fleets and to ships flying the broad pennant of commodores. Medical officers conducting the course of instruction at Haslar Hospital receive the following allowances:—The two senior officers employed on this duty, £150 a year each; the junior officer assisting, £50 a year; the junior officer instructing the sick berth staff, £50 a year. The following charge allowances may be granted to medical officers in charge of hospital ships: if above the rank of Fleet-surgeons, 5s. a day; if of the rank of Fleet-surgeon or junior, 3s. 6d. a day. Hospital allowances for naval medical officers at home and abroad, in lieu of provisions for themselves and servants, and for fuel and lights, are as follows: Deputy Inspector-Generals, at home, £67; abroad, £112; Fleet or Staff-surgeons, at home, £53; abroad, £112; Surgeons, at home, £39; abroad, £108.

Half Pay (*per diem*).—Surgeons under two years' full pay service, 6s.; after two years' full-pay service, 7s.; after four

years' full-pay service, 8s.; after six years, 9s.; after eight years, 10s.; after ten years, 11s. Staff-surgeon on promotion, 12s.; after fourteen years, 13s.; after sixteen years, and on promotion to fleet-surgeon, 14s.; after eighteen years, 15s; after twenty years, 17s.; after twenty-two years, 18s.; and after twenty-four years, 20s. Deputy Inspector-General on promotion, 25s.; after two years' full-pay service in rank, 27s.; after four years, 29s. Inspector-General, 38s.

Every medical officer will be required to undergo a post-graduate course of three months' duration at a metropolitan hospital once in every eight years. While carrying out this course, he will be borne on a ship's books for full pay and will be granted lodging and provision allowances and travelling expenses. The fees for each course (not exceeding £25) will be paid by the Admiralty. The medical officer will be required to produce separate certificates of efficient attendance in (1) the medical and surgical practice of the hospital; (2) a course of operative surgery on the dead body; (3) a course of bacteriology; (4) a course of ophthalmic surgery, particular attention being paid to the diagnosis of errors of refraction; (5) a practical course of skiagraphy.

ROYAL ARMY MEDICAL CORPS

A CANDIDATE for a commission must be 21 years of age, and not over 28 years of age at the date of commencement of the entrance examination. He must possess a registrable qualification to practise. Regulations, forms of application and declaration may be obtained on application to the Director-General, Army Medical Service, 68 Victoria Street, London, S.W. The Dean of the candidate's medical school will be requested to render a confidential report as to the candidate's character, conduct, professional ability and fitness. The candidate may subsequently be allowed to compete for a commission, having been previously examined as to physical fitness by a Medical Board.

The *Entrance Examination* (held twice a year, usually in January and July) is of a clinical and practical character, partly written, and partly oral, marks being allotted under the following scheme:—

MEDICINE (written).	Maximum Marks.
A. Examination and report upon a medical case in the wards of a hospital	125
B. Commentary upon a case in medicine . .	125

MEDICINE (oral).

A. Clinical cases; clinical pathology . . .	75
B. Morbid anatomy and morbid histology . .	75

SURGERY (written).

A. Examination and report upon a surgical case in the wards of a hospital	125
B. Commentary upon a case in surgery . . .	125

SURGERY (oral).

A. Clinical cases, including diseases of the eye; surgical instruments and appliances . . .	75
B. Operative surgery and surgical anatomy . .	75
Total marks . .	800

Having gained a place in this entrance examination, the successful candidates will undergo two months' instruction in hygiene and bacteriology, after which they will be examined in these subjects. On completion of this course, lieutenants on probation will proceed to the Depôt of the Royal Army Medical Corps at Aldershot for a three months' course of instruction in the technical duties of the corps, and at the end of the course will be examined in the subjects taught.

EXAMINATIONS FOR PROMOTION.

Lieutenant before promotion to Captain (for Lieutenants appointed after March 31st, 1901). This examination may be taken at any time after completing eighteen months' service. The subjects of the examination are: (1) regimental duties; (2) drill; (3) military law; (4) duties and accounts connected with military hospitals and their supplies; (5) other duties of executive medical officers.

Captains before promotion to Majors (for Captains promoted to that rank after July 27th, 1895). This examination may be taken at any time after completing five years' service, after terminating a period of special study. The subjects of the examination are: medicine, including specific fevers, surgery including skiagraphy, hygiene, bacteriology, and tropical diseases, and one special subject from the subjoined list, to which additions may from time to time be made—bacteriology (including the preparation of antitoxins), dental surgery, dermatology, midwifery and gynæcology, advanced operative surgery, ophthalmology, otology, including laryngology and rhinology, psychological medicine, state medicine.

Majors for promotion to Lieutenant-Colonel (for Majors promoted to that rank after March 31st, 1895). This examination may be taken at any time after three years in the rank of Major. The subjects of this examination are: (1) military law; (2) army medical organisation; (3) sanitation of towns, camps, transports, etc.; (4) epidemiology and the management of epidemics; (5) one special subject, *e.g.* (*a*) medical history of important campaigns; (*b*) a general knowledge of the army medical services of other powers; (*c*) the laws and customs of war in relation to the sick and wounded.

PAY.

At Headquarters.	Inclusive of all allowances except field and travelling allowances. Yearly.
Director-General	£2000
Deputy Director-General	1500
Assistant Director-General	850
Deputy Assistant Director-General	750

At other Stations.	Exclusive of allowances. Daily. £	s.	d.
Surgeon-General	3	0	0
Colonel	2	0	0
Lieutenant-Colonel	1	10	0
„ „ specially selected for increased pay after at least 8 years' service abroad	1	15	0
Major	1	3	6
„ after 3 years' service as such	1	6	0
Captain	0	15	6
„ after 7 years' total full-pay service	0	17	0
„ „ 10 „ „ „ „	1	1	0
Lieutenant on probation and Lieutenant	0	14	0

Adjutant of the Royal Army Medical Corps (Volunteer)—the pay of his rank.

Additional Pay.

Officer not serving on the Headquarters Staff appointed a member of the Advisory Board	£150 a year.
Officer serving as Secretary of the Advisory Board and Nursing Staff	£100 a year.
Officer under the rank of Lieutenant-Colonel holding an appointment as Specialist	2s. 6d. daily.
Quarter-Master in charge of Medical Stores at Woolwich	2s. 6d. daily.

Charge Pay.

	Daily. s. d.
(*a*) Officer in charge of a general or other hospital, or of a division of a general hospital—	
If in charge of at least 50 beds	2 6
„ „ „ 100 „	5 0
„ „ „ 200 „	7 6
„ „ „ 300 „	10 0
(*b*) Officer in command of the Depôt, Royal Army Medical Corps	5 0

Retired Pay.

	Yearly. £
Director-General (after three years' service in the appointment, and 30 years' service)	1125
	Daily. £ s. d.
Surgeon-General	2 0 0
Colonel	1 15 0
Lieutenant-Colonel, or Surgeon-Lieutenant-Colonel of the Household Troops—	
After 20 years' service	1 0 0
„ 25 „ „	1 2 6
„ 30 „ „	1 5 0
Lieutenant-Colonel, after having been in receipt of the increased pay (5s. a day) for 3 years; or Brigade-Surgeon-Lieutenant-Colonel of the Household Troops—	
Under 30 years' service	1 7 6
After 30 „ „	1 10 0
Major, or Surgeon-Major of the Household Troops—	
After 20 years' service	1 0 0
After 25 years' service, if his service reckoning for promotion is insufficient to qualify him for promotion to the rank of Lieutenant-Colonel	1 2 6
	Gratuity. £
Major or Captain—	
After 5 years' service in the rank of Captain	1000
After 10 years' service, if the officer was commissioned before the date of the Warrant	1250
After 3 years' service in the rank of Major	1800
After 6 years' service in the rank of Major	2500

Surgeon-Lieutenant-Colonel or Surgeon-Major of the Household Troops—	
After 15 years' service . . .	1800
„ 18 „ „ . . .	2500
Retirement shall be compulsory at the following ages :—	
Surgeon-General	60
Colonel, promoted to the rank on or after the date of the Warrant . .	57
Colonel, promoted to the rank before the date of the Warrant . . .	60
Other Officers	55

INDIAN MEDICAL SERVICE

CANDIDATES must be natural born subjects of His Majesty, between 21 and 28 years of age at the date of the examination, of sound bodily health, and in the opinion of the Secretary of State for India in Council, in all respects suitable to hold commissions in the Indian Medical Service. The candidate must show proof of age, a recommendation to the effect that he is of regular and steady habits, a certificate of moral character, certificate of registration under the Medical Acts, a certificate of having attended a course of instruction for not less than three months at an ophthalmic hospital, or the ophthalmic department of a general hospital.

The physical fitness of each candidate will be determined by a Board of Medical Officers.

On proving possession of the foregoing qualifications, the candidate will be examined in the following subjects :—

	Maximum Marks Obtainable.
1. Medicine, including Therapeutics . .	1200
2. Surgery, including Diseases of the Eye .	1200
3. Applied Anatomy and Physiology . .	600
4. Pathology and Bacteriology . .	900
5. Midwifery and Diseases of Women and Children	600
6. Chemistry, Pharmacy, and *either* Botany *or* Zoology	600

After passing this examination, the successful candidate will be required to attend one entire course of practical instruction of not less than four months' duration at the Army Medical School and elsewhere in (1) Hygiene; (2) Clinical and Military Medicine; (3) Clinical and Military Surgery; (4) Pathology of diseases and injuries incidental to military service. During the period of instruction each candidate will receive an allowance

of 14s. per diem, with quarters, or with the usual allowances of a subaltern in lieu thereof. At the conclusion of the course, candidates will be required to pass an examination in the subjects taught during the course.

Pay and Promotion.

The rate of pay drawn by a Lieutenant previous to arrival in India is 14s. a day, but a Lieutenant who has been permitted by the Secretary of State to hold a hospital appointment will receive no pay while holding it.

A Lieutenant may be promoted to Captain on completion of three years' full-pay service from date of first commission; but after completing eighteen months' service, and before promotion to the rank of Captain, he will be required to pass an examination in military law and military medical organisation, the result of which may affect his promotion.

A Captain is promoted to Major on completion of twelve years' full-pay service.

A Major is promoted to Lieutenant-Colonel on completion of twenty years' full-pay service.

All promotions from the rank of Lieutenant-Colonel to that of Colonel, and from the rank of Colonel to that of Surgeon-General are given by selection for ability and merit.

Pay.

The following are the monthly rates of Indian pay drawn by Officers of the Indian Medical Service from the date of their arrival in India:—

Rank.	Unemployed Pay.	Grade Pay.	Staff Pay.	In Officiating Medical Charge of a Regiment.	In Permanent Medical Charge of a Regiment.
	Rs.	Rs.	Rs.	Rs.	Rs.
Lieutenant	420	350	150	425	500
Captain	475	400	150	425	550
„ after 5 years' service	475	450	150	545	600
„ after 7 years' service	—	500	150	575	650
„ after 10 years' service	—	550	150	625	700
Major	—	650	150	725	800
„ after 15 years' service	—	750	150	825	900
Lieutenant-Colonel	—	900	350	1075	1250
„ „ after 25 years' service	—	900	400	1100	1300
Lieutenant-Colonel specially selected for increased pay	—	1000	400	1200	1400

The principal administrative appointments are held by Colonels and Surgeon-Generals on the following consolidated salaries:—

Colonels, from Rs. 1800 to Rs. 2250 per mensem.
Surgeon-General 2 @ Rs. 2200 „
„ 2 @ Rs. 2500 „
„ 1 @ Rs. 3000 „

Specialist pay at the rate of Rs. 60 a month is granted to officers below the rank of Lieutenant-Colonel who may be appointed to certain posts.

The salaries of other substantive medical appointments in the Civil and Military Departments are consolidated, and vary from Rs. 400 to Rs. 1800 per mensem.

Qualified Officers of the Medical Service are also eligible for appointments in the Assay Department. The salaries of these appointments are from Rs. 600 to Rs. 2250 per mensem.

Officers are required to perform two years' regimental duty in India before they can be considered eligible for civil employment.

Except in the administrative grades, and in certain special appointments, medical officers are not debarred from taking private practice. No officer, however employed, can receive any staff allowance unless he has passed the examination in Hindustani known as the "Lower standard."

Retiring Pensions and Half-Pay

Officers of the Indian Medical Service may retire on the following scale of pension:—

	Per annum.
After 30 years' service for pension . .	£700
„ 25 „ „ „ . . .	500
„ 20 „ „ „ . . .	400
„ 17 „ „ „ . . .	300

All officers of the rank of Lieutenant-Colonel and Major are placed on the Retired List when they have attained the age of 55 years, and all Surgeon-Generals and Colonels when they have attained the age of 60 years.

Officers placed on temporary or permanent half-pay are granted the British rate of half-pay of their military rank as under:—

Rank.	Rates of Half-pay. Per diem.		Per annum.		
	s.	*d.*	£	*s.*	*d.*
Lieutenant-Colonel . .	11	0	200	15	0
Major	9	6	173	7	6
Captain	7	0	127	15	0
Lieutenant . . .	3	0	54	15	0

MEDICAL APPOINTMENTS IN THE COLONIES

APPLICANTS for medical appointments in British Guiana, Jamaica, Trinidad, and Tobago, Windward Islands, Leeward Islands, British Honduras, Fiji, Ceylon, Straits Settlements, Sierra Leone, Gambia, Gold Coast, Lagos, Northern and Southern Nigeria, Malay States, Hong Kong, Mauritius, Scychelles, Gibraltar, Cyprus, St Helena and the Falkland Islands, must be between 23 and 30 years of age, must be doubly qualified, and preference will be shown towards those who have held resident hospital appointments. Applications for medical appointments should be sent to the Assistant Private Secretary, Colonial Office.

Information regarding medical appointments in Cape Colony and Natal can be obtained on application to the Agent-General to the Cape, 100 Victoria Street, London, S.W., and the Agent-General for Natal, 26 Victoria Street, London, S.W.

Medical appointments in Rhodesia are made by the British South Africa Company, 2 London Wall Buildings, E.C.; those in the Transvaal and Orange River Colonies are made on the recommendation of the Governors of these Colonies.

Recent Literature

CRITICAL SUMMARIES AND ABSTRACTS

MEDICINE

By FRANCIS D. BOYD, C.M.G., M.D.

LUMBAR PUNCTURE AND CYTODIAGNOSIS

IN the first volume of the *Scottish Med. and Surg. Journal* there appeared a digest on lumbar puncture of the spinal meninges as a diagnostic and therapeutic measure. At that time considerable attention had been paid to the bacteriological examination of the fluid, and while positive results gave valuable information in such conditions as cerebro-spinal meningitis, tuberculous and epidemic—negative results were frequent and should be taken at their own value.

Since then the method has been much elaborated, and the

examination extended to the chemical, physical, and especially the cytological character of the cerebro-spinal fluid, and has been found to yield valuable results in the diagnosis of even the chronic affections of the central nervous system.

To obtain fluid for examination, the patient is laid on one or other side, with the body bent forward to render the lumbar spine prominent and convex. A line drawn between the highest points of the two iliac crests crosses the middle of the fourth lumbar vertebra, and is thus a guide to the fourth lumbar interspace—the most desirable site for puncture (Sicard). The needle for use should be about 10 centimetres long, and for an adult about $\frac{8}{10}$ths of a millimetre in bore. It is best made of platinum or platino-iridium so that it can easily be disinfected in the flame of a spirit-lamp. The skin having been disinfected, and the fourth interspace having been fixed with the operator's index finger, the needle is entered half a centimetre to one side of the middle line, and is directed with a slight inclination upwards and towards the middle line. The needle should enter the theca close to the middle line and so avoid the main nerve trunks which lie to the sides. The pressure used should be gradual, and requires to be fairly firm, as considerable resistance is experienced on passing through the ligament. The feeling of resistance given by the ligament is characteristic. Should the needle come against bone, it should be partially withdrawn, and re-entered at a lower level. The pain from skin puncture may be minimised by a preliminary freezing with chloride of ethyl.

With the needle in position, the cerebro-spinal fluid under normal conditions will flow drop by drop and should be collected in sterilized centrifuge tubes, not more than 10 to 20 c.c. being withdrawn for examination (Krönig).

Cerebro-spinal fluid is normally a clear liquid with a specific gravity of about 1007-8 and of a faintly alkaline reaction. It contains about 1 per cent. of solids, chiefly sodium chloride. Normally there is not more than 1 part per 1000 proteids. Those consist almost entirely of proteoses; there is a very small amount of globulin, but no serum albumin. In addition there is present in cerebro-spinal fluid a non-nitrogenous substance which has the power of reducing copper in alkaline solutions. This substance is not sugar, as was at one time

supposed, but is pyrocatechin, and is derived from the decomposition of proteid.

Under pathological conditions the naked eye appearances of the fluid may vary; it may be blood-stained. If pure blood escapes it is probable that a spinal vein has been punctured, and the operation should be repeated at a different point. If the fluid be merely blood-stained, the staining may be due to the operation or to the nature of the fluid. Sicard found that as a rule fluid tinged with blood from hæmorrhage into the subarachnoid space was of a darker tint than when the staining was due to the operation. If on centrifuging the sanguinolent fluid, the spectroscope shows reduction bands due to the presence of hæmoglobin, there has been a hæmorrhage into the central nervous system; in some cases of meningitis, however, the cerebro-spinal fluid may lake the blood due to the puncture and thus lead to a wrong diagnosis (Campbell). Bard has called attention to an amber coloration of the liquid after centrifuging, due to a pigment probably derived from the blood. The presence of this amber pigmentation points to a hæmorrhage into the central nervous system, or to acute inflammation of the meninges.

The proteids of normal cerebro-spinal fluid consisting principally of proteoses with a mere trace of globulin, the fluid on heating shows but a mere opalescence. If, on heating, a distinct cloud appear, the fluid must be considered to give a pathological albumin reaction. In cases of tabes dorsalis, general paralysis, meningo-myelitis, and hemiplegia, this pathological albumin reaction has been found constantly present (Widal and Sicard, Guillain, and Parant). Normally cerebro-spinal fluid does not contain nucleo-proteid nor fibrinogen. Spontaneous coagulation does not, therefore, take place. In inflammatory infections of the spinal meninges, fibrinogen and nucleo-proteid being present, spontaneous coagulation occurs in the fluid on standing. Spontaneous coagulation may, therefore, be considered definite evidence of meningeal inflammation.

The molecular concentration of the cerebro-spinal fluid, as brought out by the freezing-point method — cryoscopy — is somewhat greater than that of the blood, but the results of different observers vary somewhat.

The freezing-point of normal blood is -- 0.56°. According to

Widal, Sicard, and Ravant, that of the cerebro-spinal fluid is - 0.72° to - 0.78°, while Achard and Loeper place it at - 0.50° to - 0.60°.

In acute meningitis the molecular concentration of the cerebro-spinal fluid is diminished, and the depression of the freezing-point is lessened, - 0.50° to - 0.60°. In every case it is necessary to make a coincident examination of the blood and cerebro-spinal fluid before any conclusion can be drawn, as with renal inadequacy the freezing-point of the blood may be considerably depressed. The results then given by cyroscopy can only be regarded as confirmatory of other factors. If inversion of the molecular concentration of the blood and cerebro-spinal fluid be present, it points to the existence of meningitis; absence of this inversion, however, by no means excludes meningitis.

In the study of the cerebro-spinal fluid in diseased conditions, by far the most important results are given by consideration of the cellular elements in the fluid—cyto-diagnosis. To carry out the observation it is desirable to follow out rigidly the technique suggested by Widal. 3 to 6 c.c. of the fluid to be examined are taken and centrifuged for ten minutes. The super-natant fluid is decanted, and the tube is inverted on blotting paper and left to drain. A fine capillary pipette is taken, and the bottom of the inverted tube is scraped, and any fluid remaining in the tube rises in the pipette, carrying with it the cell elements. The fluid is then carefully blown on to three cover slips, and the film left to dry in the air, or in the oven at a low temperature. Fixation is carried out by immersion, face downwards, in a mixture of equal parts of alcohol ether, or by gently pouring the alcohol-ether mixture upon the slides. The films are then stained with hæmatoxylin and eosin, Ehrlich's triacid stain, or with Unna's polychrome blue.

In normal cerebro-spinal fluid, cell elements are scarce; in a single field, with an oil immersion lens, normally only three lymphocytes should be visible; under pathological conditions all the varieties of leucocytes may be found in more or less abundance. In tuberculous meningitis there is an increase in the number of cell elements; as a rule those cells are for the most part lymphocytes, with an occasional polymorpho-nuclear leucocyte and an endothelial cell. In a few rare cases of tuberculous meningitis, the polymorphonuclear leucocytes may

almost equal the lymphocytes. In other forms of acute meningitis, during the initial stages and during the height of the disease, a polymorphonuclear leucocytosis is present; during the period of recovery, however, lymphocytes may predominate, but the clinical features of the disease will by then have enabled the observer to establish a diagnosis.

Lymphocytosis, then, with grave cerebral symptoms, is fairly characteristic of tuberculous meningitis. It must, however, be mentioned that in exceptional cases a lymphocytosis has been found in tumours of the cerebellum, fracture of the base of the skull, and typhoid meningitis, but the occurrence of a lymphocytosis in such conditions is very exceptional.

In chronic affections of the central nervous system the evidence furnished by cyto-diagnosis is of great interest. Without there being a cellular picture characteristic of different diseases, the rule may be established that whenever the meninges are affected in any chronic diseases, a lymphocytosis occurs. In chronic meningo-myelitis, of whatever nature it be, a lympho cytosis exists, and the same may be said of cortical lesions where the meninges are implicated (Babinski and Nageotte). Lymphocytosis existing with symptoms pointing to cerebral tumour enables one to state that the tumour is implicating the meninges. In deep-seated cerebral tumour lymphocytosis is absent. The other affections of the nervous system where cyto-diagnosis gives considerable assistance are syphilis, tabes, and general paralysis of the insane. In long-standing syphilis, without any disease in the central nervous system, the cerebro-spinal fluid is normal. Whenever, however, any affection of the meninges occurs, even though there be no definite clinical signs, the lymphocytosis appears. Babinski has insisted on the clinical value of the Argyll-Robertson sign as demonstrating a syphilitic affection of the central nervous system. Later he pointed out that in such patients, along with the Argyll-Robertson phenomenon, there was a marked lymphocytosis. The occurrence of a lymphocytosis during the secondary period of syphilis points to an affection of the meninges, and to a special tendency for the poison to affect the central nervous system. In tabes dorsalis lymphocytosis is present during the entire course of the disease. In fourteen cases instanced by Sicard, lymphocytosis was invariably present. Schoenborn states

that in eight cases of tabes, lymphocytosis was only once found, and in that case syphilitic meningitis was present, but this observation does not agree with the bulk of the evidence.

In general paralysis of the insane lymphocytosis is, according to Joffroy, the most constant and earliest indication of the disease. Lymphocytosis is usually very abundant. This lymphocytosis is maintained during every period of the disease. Immediately preceding, during, and for a short time subsequent to congestive attacks, an increased proportion of polymorpho-nuclear leucocytes are present. This polymorpho-nuclear leucocytosis is the only variation which exists in the course of general paralysis. It should, however, be stated that there are one or two cases (notably one by Joffroy and another by Dupré) bearing all the clinical symptoms of general paralysis, in which a cyto-diagnosis gave a negative result. Joffroy explains such a result by supposing a very slight meningeal lesion; but this explanation does not seem to hold, as Nageotte has shown that the slightest meningeal lesion will result in lymphocytosis. The cases are, however, so few as not to invalidate the virtue of the method. In other diseases of the nervous system, and in the various psychoses, cyto-diagnosis gives a negative result. Dupré especially has insisted on the absence of positive results in different mental affections. The importance of such an observation cannot be over-estimated from a diagnostic point of view. Dufour reports a case which well illustrates the value of the method as an aid to diagnosis. A man was admitted under his care in a condition of excitement—cyto-diagnosis negative. General paralysis was therefore eliminated, and the diagnosis of alcoholism arrived at. Some time after, lumbar puncture showed a definite lymphocytosis. The autopsy demonstrated small meningeal lesions of a recent date, which had revealed their presence during life by a lymphocytosis. A case well illustrating the value of the method was recently under the writer's care, admitted with right-sided headache and optic papillitis. There was no tenderness on percussion, and no other signs or symptoms of cerebral tumour. Syphilitic infection was denied. Lumbar puncture showed a marked lymphocytosis, indicating meningeal cause of the headache. The diagnosis: probably

pachymeningitis syphilitica. Under iodide of potash the headache rapidly disappeared.

Chavasse and Mahu have studied lumbar puncture as a diagnostic agent in the intra-cranial complications of otitis. They find that in extra-dural and sub-dural suppurations the cerebro-spinal fluid maintains its normal composition as long as the sub-arachnoid space remains free from irritation. In circumscribed meningitis they find that lumbar puncture has not given sufficiently precise indications to make it of value in the diagnosis of such cases. In cerebral abscess and thrombosis of the lateral sinus, the liquid is normal but often increased in quantity and under increased pressure. The fluid maintains its normal composition in labyrinthine disease. They consider that the cytological examination of the cerebro-spinal fluid is a distinct advance in the diagnosis of intracranial complications of ear disease, and as such regard it as worthy of general application.

Any method to come into general use for diagnostic purposes must be proved to be free from danger and not to require too great technical skill. Lumbar puncture, it must be admitted, is more easily performed (like every other operation) when the operator has had some experience. An occasional failure to obtain fluid, while disappointing, may be expected at first. Do dangers exist? Headache and vomiting may result if too considerable a quantity of fluid be withdrawn. Localised twitchings in one or both legs may follow puncture of a spinal nerve, if the needle enter the spinal canal at one or other side of the middle line. Cases are recorded where hæmorrhage into a cerebral tumour, following lumbar puncture, proved fatal.

When, however, one considers the conditions under which lumbar puncture is undertaken and the aid which may be expected from it in the diagnosis of obscure and grave conditions, one concludes that the risks attached to the operation are not sufficient to debar it from taking a recognised place as a diagnostic measure. In those cases in which accidents have occurred the patient's condition was such as to render a fatal issue probable if not certain, and it is unfair to attribute to the lumbar puncture a result which should really be attributed to the pathological conditions for which it was undertaken.

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DISEASES OF CHILDREN

By JOHN THOMSON, M.D.,
Physician to the Royal Hospital for Sick Children, Edinburgh

ON THE CAUSATION AND TREATMENT OF INCONTINENCE OF URINE IN CHILDREN

THE etiology of enuresis has always been a much disputed matter. Some regard it as a purely functional disturbance; some think that there is always a local disease behind the neurosis; and many take a somewhat intermediate view. The clinical varieties of the malady are generally admitted, theoretically, to be numerous. In practice, however, there is a strong tendency for the medical man to get into the way of classing the cases unscientifically into two groups—those which recover more or less rapidly under large doses of belladonna or atropin along with ordinary common-sense regulation of the diet and habits and the removal of obvious sources of irritation, and those which persist or get worse in spite of all such measures. This latter group is not a small one, and the cases which form it are such a frequent source of disappointment and humiliation to the practitioner that any fresh suggestions for dealing with them are well worth considering.

Far the most important recent contribution to the subject is that of Dr J. G. Rey of Aix-la-Chapelle. He has written a

most interesting and instructive paper (*Rev. d'hyg. et de méd. infant.*, T. iii. No. 2, 1904, and *Berl. klin. Woch.*, 29th Aug. 1904) on the results of his experience in the investigation and treatment of fifty-two cases of enuresis in children which he has had under observation during the last five years. In these cases not only were the general symptoms studied, but the urine was fully examined microscopically, chemically and bacteriologically; and in the girls and older boys the cystoscope was used when possible. Rey is convinced that when there is no central nervous lesion or mental defect present, and no infantilism or athyria, the wetting is always primarily due to the presence of local disease or irritation of the bladder or of neighbouring parts. The local disease or irritation may have passed off by the time the case is seen, but originally it was there. In cases where the local cause recovers in this way but the enuresis continues, it is easy to see that faradism, epidural injections, etc., may bring about a sudden cure.

One of the commonest and most important causes is **Latent Cystitis due to Bacillus coli.** This organism, as is well known, may produce acute or chronic febrile purulent cystitis with turbid urine and a heavy deposit. The cases, however, referred to here are of a much milder type. In them the urine seems, on casual inspection, almost normal, or only slightly turbid. In nineteen out of his fifty-two cases, Rey found large quantities of bacillus coli in the freshly-passed urine, which was generally acid and had a heavy, unpleasant odour. This latent form of coli-cystitis is especially common in girls, and is often responsible for their becoming pale, miserable and irritable, although free from any noticeable local symptom. When one remembers how little there is in the way of localising symptoms in acute feverish cases of coli-cystitis, one cannot wonder that the latent form of the disease should very often be overlooked. The treatment of the condition consists in the persevering application of antiseptics to the whole of the urinary tract. Rey has found the internal administration of salol, along with strict milk diet and regular meals, to be better than washing out the bladder.

Another very important cause of enuresis is **Simple Mucous Cystitis.** In this also the symptoms may be extremely slight, and the urine only contains mucus, some epithelial cells and some leucocytes. It may sometimes be difficult to demonstrate any pathological constituents in it. This form of cystitis is often met with in badly-nourished, injudiciously fed, and rickety children. It sometimes arises in connection with what is called "acid intoxication," in which the urine becomes ammoniacal and so irritating that it sets up ulceration of the prepuce and eczema in the gluteal region. This sort of urine is apt to cause simple

mucous catarrh. When the symptoms are very acute the child may scream from pain on each attempt to empty the bladder, and he is often circumcised owing to the idea that his symptoms are due to phimosis. The child's distress can often be relieved, even within twenty-four hours, by regulation of the diet and the administration of salol. Out of Rey's fifty-two cases, twenty-four had this form of bladder-catarrh; and seventeen of these were boys. Even in older children the urine has often a markedly ammoniacal odour, contrasting strongly with the heavy, offensive smell which characterises that of the coli-cystitis cases. In some cases there is a special irritation of the meatus and its neighbourhood which leads to marked constriction of its lumen. When this is present it greatly favours the continuance of the incontinence.

A less frequent cause of enuresis, which accounted for three of Rey's cases, is **Phosphaturia.** This may give rise to frequent micturition and enuresis when the urine is concentrated or when there are crystals of triple phosphate in it. It is best treated by a flesh diet and a diminution of vegetable food.

In one of the fifty-two cases there was a large **increase of uric acid** in the urine, which deposited numerous and large crystals when acidulated and allowed to stand. The incontinence was rapidly stopped by the adoption of a vegetable diet.

In three of the cases the enuresis was attributed to an **accumulation of smegma** about the corona glandis, owing to the persistence of the natural physiological adhesion between the glans and the prepuce. When this was separated, permanent recovery took place.

In the remaining two cases, large quantities of **oxyurides** were present.

In beginning the treatment of a case of enuresis, any obvious general or local morbid condition which might be a cause of the condition is first to be dealt with. If none such is found, the urine must be searched for signs of urethritis or cystitis. In very many cases a proper ordering of the diet will cure, or at least greatly improve matters. What is best is usually a diet of four or five meals in the day of bread and milk or porridge and milk, and nothing else, especially no fruit or sweets.

Tonics are useful, and Rey recommends a mixture of condurango and hydrochloric acid before meals to improve the appetite and digestion. At the same time he gives fairly large doses of salol after food. These will have caused distinct improvement by the end of a week, and afterwards can be given less regularly, perhaps every alternate three or four days. In obstinate cases he adds strychnine. A moderate amount of hardening treatment by the administration of short douches or

cold baths is also useful. It is very important to see to the child's clothing; he should wear long stockings, and the bladder region, as well as the legs, must be kept warm. Cold and wet feet are, of course, to be avoided, and damp and draughts generally are to be guarded against.

If after disappearance of the local trouble the enuresis persists, then is the time when the child may be the better of being seriously spoken to, and the application of faradism, massage of the prostate, epidural injection, etc., may also do him good. Raising the foot of his bed may sometimes help, and the frequent waking of the patient and making him pass water is advisable not only as cultivating a good habit, but also because it helps to prevent his getting a chill from lying in wet sheets.

Dr Percy Lewis of Folkestone (*Brit. Journ. of Children's Diseases*, February 1904) describes a type of cases of enuresis which he has found common, and in which he thinks that the trouble is *directly due to* **dietetic errors**. These children, he says, "are mostly unhealthy in aspect, being either anæmic, bilious-looking, or lymphatic. Their skins are dull, and inclined to acne or some of the low forms of eczema. They are generally not fond of meat, eat irregularly, and live mostly on farinaceous and saccharine foods. They are disinclined for exertion or school work." They have a sort of nocturnal polyuria, and pass seldom less than two pints of urine of low specific gravity in the night, and sometimes twice as much. The water is neutral or alkaline in reaction, with a deposit of triple phosphates or oxalates. Very frequently there is a trace of albumin. In the simple nocturnal cases the urine generally assumes a normal character during the day.

The treatment is mainly dietetic. In most instances a rigid antidiabetic diet removes the symptom in a few days. General tonic treatment is also given, and after three or four weeks an ordinary diet may be safely returned to.

MM. Genouville and Campani (*Presse méd.*, May 11, 1904) regard enuresis as due to weakness of contractility of the bladder sphincter, and hold that its rational treatment, therefore, consists in **faradisation** of that structure. This they apply directly by means of a bulbous-ended bougie in the urethra in the case of older girls, and in the vagina in younger ones. In boys they find that the one pole may be quite satisfactorily placed on the perineum instead of in the urethra. They claim that this treatment, properly carried out, cures 55 per cent. of cases, and greatly improves another 25 per cent.

About three years ago Dr F. Cathelin suggested the use of what he called **epidural injections** for a variety of derangements

of the genito-urinary apparatus. The treatment consists in the injection of a quantity of normal saline solution into the sacral canal below the termination of the dural sac. Incontinence of urine was one of the maladies for which it was most strongly recommended. In a recent paper (*Presse méd.*, March 26, 1904) Cathelin gives a resumé of about twenty articles which have appeared on this subject in Continental and American literature since his first communication. His own further experience of the method has confirmed his opinion of its harmlessness as well as efficacy. He has made two thousand injections, apparently without any mishap.

Dr G. Kapsammer describes his experience of epidural injection for enuresis in 45 children treated in Professor v. Frisch's clinique in the Vienna Poliklinik (*Arch. f. Kinderheilk.*, Bd. 38, H. 5, 1904). For the little operation, which is quite easy, he finds it best to use a metal syringe which can be thoroughly boiled, and a needle about 4 cm. long. He injects from 10 to 40 c.c. of saline solution at a time. The patient is laid, face downwards, over a wedge-shaped pillow, so as to elevate the sacral region. After the strictest antiseptic precautions have been taken, the needle is passed into the lower end of the sacral canal. The point chosen for entering is a little above the middle of a line connecting the ends of the cornua coccygea of the sacrum. These are easily felt unless the child is very fat. The needle is inclined at an angle of about 60° to the skin, until it meets with the resistance of the front wall of the sacral canal. It is then turned gradually in a horizontal direction and passed up the sacral canal. Care must be taken not to pass the needle so far in as to puncture the dura. The manipulations must, of course, be very gentle, so as not to break the needle, and the fluid is to be injected very slowly. The puncture is closed with sterilised gauze and plaster, and the child may be treated as an out-patient. In none of the cases were there any unpleasant symptoms, except that occasionally pains were felt in the legs and two of the children vomited.

The benefit of the injections is sometimes seen from the first; but even when this is so, it is well to give at least three within a week before they are discontinued. Sometimes the improvement which follows the first injection lasts only a short time, but each subsequent injection produces a more lasting effect than the one before it. Occasionally an aggravation of the symptoms follows the first injection, but even in such cases improvement may set in later. Of his forty-five cases, Kapsammer reports thirty-eight as cured, five as improved, and two as having relapsed. Dr Artur Strauss (*Therap. Monats-*

hefte, Feb. 1904), after a similar although smaller experience, comes to the same conclusions as Kapsammer. Both writers regard the epidural injections as a useful addition to the means at our disposal for treating obstinate cases of enuresis which have resisted other measures.

Another new method of treatment for obstinate cases of enuresis has been devised by Professor Jaboulay and is described by Dr J. Revel (*Thèse de Lyons*, abst. in *La Clinique Infantile*, 14th July 1904). This consists in the **injection into the retro-rectal connective tissue of large quantities of sterile salt solution.** The justification of this proceeding is the idea that incontinence of urine arises from a functional disturbance of the sympathetic nervous system at the level of the hypogastric plexus; and the fluid injected is supposed to exert some sort of mechanical effect on the plexus.

For the operation a large syringe is required, and of course the antiseptic precautions cannot be too stringent. The patient lies on his side with the under leg and thigh extended and the upper fully flexed. Standing on the patient's left the doctor passes his left finger into the rectum to serve as a guide to the needle of the syringe. The needle is then inserted at the tip of the coccyx or a little to one side of it and passed carefully up behind the rectum. From 100 to 150 c.cm. are introduced. The effect of the injection on the incontinence is said to be marked and immediate. The patient, who has been wetting the bed nightly, ceases at once to do so; and he may even have retention for several days. If a relapse occurs, the injection must be repeated. Revel had three patients who were treated in this way with complete success.

MEDICAL JURISPRUDENCE

By CARSTAIRS DOUGLAS, M.D., B.Sc., F.R.S.E.,
Professor of Medical Jurisprudence and Hygiene, Anderson's College, Glasgow

First Aid in Cases of Poisoning.—In a recent number of the *Ungarische Medizinische Presse*, Aczel, of Budapest, contributes an article on first medical aid in cases of poisoning which it is of interest to compare with the methods in vogue in this country. The author, who is at the head of the Budapest First Aid Society, states that poisoning occurs most commonly from caustic alkalies, and that in the decade 1887-1897, out of 1032 suicides, no fewer than 415 were due to these substances. In rendering first aid, the stomach-tube is only to be passed if

the case is seen within a quarter of an hour of the swallowing of the poison. If found later, weak acids (vinegar, acetic acid) are administered; while in cases where a considerable time has elapsed the treatment is purely symptomatic, *e.g.* use of oils, milk, narcotics, and so forth.

Second in frequency comes phosphorus, it being responsible for 297 cases in the list of 1032. Early cases are treated by copper sulphate, which is given in doses of 1-2 teaspoonfuls of the 5 per cent. solution; this acts both as an emetic and a chemical antidote. A more vigorous line of treatment is to wash out the stomach with potassium permanganate solution (1-3 per 1000), while, in default of these, oil of turpentine is given in 1 gramme doses. Less frequently cases occurred where muriatic or sulphuric acid had been swallowed; here Aczel says early washing out, with great care, may be employed, while in default of this, magnesia is given per os.

Carbolic acid appears to be a not unfrequent poison in Hungary, and cases are energetically treated, if seen early, by gastric lavage with plain water or solution of sodium sulphate, or weak milk of lime, or with solution of saccharated lime. Emetics act badly and cannot be relied on. Friction to the surface, vapour-baths, stimulants, and saccharated lime in teaspoonful doses are given by the mouth.

Among the metallic poisons, the following have been met with, viz., corrosive sublimate, copper sulphate, arsenious acid, and potassium cyanide. Corrosive sublimate cases are treated by washing out and emetics, while draughts of milk or albumin water are administered. Common salt, which aids in the absorption of the poison, is to be avoided. Where blue-stone has been swallowed, lavage with a 1 per cent. solution of ferro-cyanide of potash should be employed, and if that body is not at hand plain water should be used. Arsenic poisoning is treated by lavage, and emesis induced by Epsom salts and cream of tartar. Thereafter hydrated ferric oxide and magnesia are given by the mouth—a couple of teaspoonfuls every ten minutes or so. In potassium cyanide, the medical man is generally too late on the scene to make lavage of any use; but if time permit, washing out with 0.5 per cent. potassium permanganate should be attempted. One may also inject 20-30 c.cm. of 0.5 per cent. solution of nitrate of cobalt. As a rule, however, one relies on artificial respiration, friction and general stimulation.

Turning now to the alkaloidal poisons, we find that in Budapest as here, opium and morphia occupy a leading place. Washing out of the stomach is employed, the wash-water containing tannin or iodine in iodide of potassium, or 0.1 per cent. of potassium permanganate. Vigorous efforts are made to

rouse the patient, by walking, etc., and atropine is given in doses of 1-2 mgr. ($\frac{1}{60}$—$\frac{1}{30}$ gr.) every ten to thirty minutes. Poisoning with cocaine and atropine are not often met with; the stomach is emptied and the case treated on general principles; while in the case of strychnine, chloroform vapour is exhibited, the stomach emptied, and chloral injected; the lavage water may contain tannin or iodine to precipitate the alkaloid. In conclusion, a few words are said on noxious gases and harmful articles of food and drink, and we may agree that the lines of treatment laid down are in every way satisfactory and up-to-date.

Death by Laryngeal Inhibition.—In the current number (September 1904) of the *Annales d'Hygiène Publique et de Médécine Légale*, Brouardel discusses this subject with some fulness. In a paper read by him before the Medico-Legal Society of Paris, he states that his reason for dwelling on the matter was that, in a recent case where death from asphyxia was supposed to be due to strangulation by the hand, he had given it as his opinion that it had resulted from laryngeal inhibition. The facts of the case were these: In February of this year a shoemaker named Dézelé was arrested for causing the death of a young woman, Emilia Meunier. In his declaration the accused said that the girl called at his shop as he and she were good friends, and began to tease and annoy him at his work. He bade her desist, and when she would not, he suddenly caught her by the throat, gave it a squeeze and a shake, when she suddenly fell backwards, her body gave a few convulsive jerks, and she expired at once. The accused added that he had not the remotest intention of doing her any harm.

Dr Blaise made the autopsy and gave it as his opinion (from which Brouardel differed) that death was due to strangling. The latter inclined to the view that the death had resulted from the sudden stimulation of the skin of the front of the neck, where a sudden squeeze of the larynx can cause death almost at once by an arrest of the circulation and respiration.

The arguments against strangulation by the hand were numerous. The victim, for example, usually fights, struggles, and cries, unless first rendered unconscious by a blow (of which there was no evidence in this case), and numerous lesions are always produced. Death rarely occurs under ten minutes, and during this time the assailant cannot keep his hand steady on the neck, so that various marks are produced. The hyoid, the sides of the larynx, the nose, mouth, and cellular tissue of the neck all show bruises and extravasations, and the clothes become torn and disordered. Since the victim usually tries to

scream, the other hand of the murderer is generally pressed firmly on the nose and mouth, and leaves traces of the nails and finger-points. All these features were absent in the case under review. Turning now to the internal post-mortem signs, we find that Dr Blaise based his diagnosis of asphyxia on the presence of a plug of white froth at the mouth, on the congestion of the lungs and brain, on the sub-pleural ecchymoses, on the patches of pulmonary emphysema, and on the absence of clots in the heart.

Brouardel proceeds to point out that these may be explained apart altogether from strangulation. The post-mortem records show that, at the time the autopsy was performed, the post-mortem lividities were well marked, and at the same time the engorgement of the lungs was pronounced. These two features indicate that at this time decomposition was already beginning.

Duclaux has shown that early after death, fermentation takes place in the bowels, leading to the formation of gas. This pushes up the diaphragm, which comprises the lungs, forcing froth and mucus from the bronchial tubes into the mouth, and driving the blood from the pulmonary vessels into other parts of the body and into the spleen, liver, and brain. This "posthumous circulation" has often been demonstrated in the case of people who have died naturally in their beds. The occurrence of punctiform pleural ecchymoses, continues Brouardel, is not of great importance. Tardieu indeed says that they do not occur in strangulation. They may occur in the case of infants, and are found in the case of forceps-delivery. Experiments made by the writer, Descourt and Laborde, showed that they generally arise suddenly when a sudden vascular spasm is caused, especially if one press on the roots of the vagus, the trunk of the nerve, or on one of its branches. In brief, the external marks did not correspond with those of asphyxia due to manual strangulation, while the alterations in the viscera were in part to be accounted for by changes due to decomposition, and could not in themselves be held to be distinctive of death by strangulation.

Were the lesions found, says Brouardel, such as are consistent with sudden death due to reflex inhibition? Death occurring in this way as a result of a sudden blow on various parts of the body is clearly recognised by medico-jurists, and the following case in point may be cited: A priest, whose conduct left something to be desired, was about to take leave of his mistress, and said that they would be happier if dead. He asked her if she wished to see if he could hurt her, and on her replying in the affirmative, he caught her by the neck, while she was still smiling. Suddenly she made a gesture of pain, wrung her hands, but uttered no cry; her lover relaxed his grasp, when

the woman fell to the ground, and on being lifted up was found to be dead. Other parts of the body where sudden blows or irritation may lead to sudden death are the epigastrium, the genital organs, and the nostrils. This is due, of course, to reflex action, the irritation proceeding along a sensory nerve to its centre, thence to one or more other centres, and finally a stimulus being transmitted outwards along motor or secretory nerves. If the stimulus is moderate, increase in function takes place; if intense, total inhibition; and so it may be sudden death. Another case, recorded by Tardieu, may be quoted as showing the part the laryngeal region may play in this respect. A street urchin came to an old woman who sold tobacco, to buy some, and as she was weighing it out, he watched, in an interested way, the movement, up and down, of the Adam's apple in her throat. Suddenly, in a spirit of mischief, he slapped it with his hands as if he were catching a butterfly, and the old woman at once dropped down dead. It may, says the writer, be urged in objection that many cases do not die where pressure has been applied in a similar fashion to the laryngeal region. This may be true, and we certainly do not know all the facts regarding this phenomenon, but we know enough to say in court that death can occur under such circumstances. In the case of the woman Meunier there were hardly any marks present save those on the front of the neck, which consisted practically entirely of small superficial ecchymosed patches. There were no large bruises or extravasations, no tearing of muscles, and no damage to the laryngeal cartilages, and it was quite clear that the violence applied must have been neither great nor prolonged, such as is almost invariably the case in criminal strangling. The presence of two thumb-marks (left hand) led Dr Blaise, who performed the post-mortem, to conclude that the tragedy had taken place in two stages. Brouardel agreed so far, but said these stages were separated by a very short interval, and were indeed nothing more than two squeezes applied to the larynx, the whole thing occupying but a few seconds. As regards congested appearances of the lungs, that is consistent with death by sudden inhibition; Vibert has even found hæmorrhages into these organs, and Maschka states that the lower lobes in particular may be filled with frothy, blood-stained exudation, and that the mucosa of the tubes and windpipe may be of a rose-red colour and contain viscid mucus. Brouardel then sums up as follows: (1) The cadaver of Emilia Meunier does not present the lesions which one finds in strangulation by the hand, determining death by asphyxia. (2) The lesions of the skin on the front of the neck are the result of relatively feeble pressure, since there are neither subcutaneous hæmorrhages nor lesions of the muscles or of the

larynx. Taking these points into consideration, and the shortness of the time before death supervened, and the fact that it is just in these instances of slight violence that these sudden accidents occur, the conclusion was arrived at that death resulted from inhibition of heart and lungs induced by the sudden shock to the neck.

Since the sitting of the Assize Court at Mans in the Meunier case (March 17, 1904), Brouardel had another case of a very similar nature. On March 20, at the asylum of Villejuif, an attendant was killed by a lunatic under the following circumstances. The assailant was an inmate who had often been troublesome, and had been confined several times by himself for attacking his fellow-patients. On this occasion he had been unruly, and on being threatened with isolation again by an attendant, he sprang at him and seized him by the throat with his right hand, placing at the same time his left arm round his victim's waist. The unfortunate attendant cried for help, and he and his assailant fell to the ground. Another man ran to separate them, and had succeeded in partially raising the attendant when the latter fell dead on the floor. The whole affair occupied about one minute. The post-mortem, performed on March 23, showed that there was very little external sign of injury to the neck. The mouth was filled with a plug of mucus, and both the lungs were extremely congested, though they could float when cut up. All the organs of the body otherwise were healthy. The conclusion arrived at in this case also was that death was due to laryngeal inhibition.

One of the points in connection with this form of death which has proved most puzzling is the occurrence of sub-pleural ecchymoses (Tardieu's spots). These occur in death from hanging, suffocation, drowning, strangling, in death in nervous illnesses (*i.e.* epilepsy and meningitis), and in affections of the chest. It was formerly believed that they were due to raising of the blood-pressure during violent respiratory efforts, but Brouardel details various experiments on dogs, which go to support two points : (1) the most important factor in the production of these spots is the nervous system ; they do not depend on respiration, but on a spasm probably affecting the vaso-motor nerves ; (2) they appear in an instant, at the moment of the spasm, whatever be the duration of the action which calls forth their appearance, and even though that last for but a second or two. The congestion of the lungs noted in these cases can also be explained, says Brouardel, by a comparatively sudden onset. Many clinicians (Woillez, Weill of Lyons, Potain, Huchard) have described rapidly occurring congestion of the lungs, such as was found in the case of the attendant at Villejuif Asylum, and had

previously been observed in death by inhibition following blows on the abdomen (Maschka, Vibert, Brouardel). In conclusion, Brouardel states that these various phenomena appear to have as their cause a lesion, partly direct, partly indirect, of the nervous system, and to be dominated by stimulation of the vagus, the nerve of inhibition of the heart.

It may be noted that Dézelé, the assailant in the Meunier case, was found guilty of the assault, but without intention to murder, and was sentenced to three years' imprisonment.

New Books and New Editions

A System of Physiologic Therapeutics. A Practical Exposition of the Methods, other than Drug-giving, useful for the Prevention of Disease and in the Treatment of the Sick. Edited by S. S. COHEN, A.M., M.D. Volume vii. Mechanotherapy and Physical Education, including Massage and Exercise, by John K. Mitchell, M.D., and Physical Education by Muscular Exercise, by Luther H. Gulick, M.D.; with special chapters on Orthopedic Apparatus, by James K. Young, M.D.; On Corrective Manipulations in Orthopedic Surgery (including the "Lorenz Method"), by H. Augustus Wilson, M.D.; and on Physical Methods in Ophthalmic Therapeutics, by Walter L. Pyle, M.D. 8vo, pp. 420, with 229 illustrations. London: Rebman, Ltd. 1904. Price 12s. 6d. net.

THE first part of this volume, the seventh in a series of eleven, is devoted in a full manner to massage and exercise, and the methods to be adopted in the treatment of various morbid conditions. There is a useful chapter on "Free Work for Home Exercise," in which, rightly, there is a warning against the development of big muscles to the neglect of rapidity of movement. All the manipulations are clearly explained, and accompanied by admirable photographs.

In the second part, Dr Gulick deals with physical education in a general way, and discusses the relative merits of various methods and games. It is curious, after the previous reading, to come across, in the Addenda, an article on Orthopedic Apparatus, which contains illustrations of some weird constructions employed in the treatment of such a deformity as lateral curvature of the spine.

Corrective Manipulations in Orthopedic Surgery is an interesting article, fully and admirably illustrated, especially on the

subject of congenital dislocation of the hip and the treatment by the Lorenz method.

The proper physical development of the body and breathing exercises are too often neglected in the treatment of disease, and there is here something to aid and stimulate our knowledge.

Some overlapping of different opinions occurs in the book, but apart from that there is interest in reading it, and to some it may prove a useful work of reference.

Arhythmia of the Heart: A Physiological and Clinical Study. By Dr K. F. WENCKEBACH. Translated by THOMAS SNOWBALL, M.A., M.B. Pp. 198. Edinburgh and London: William Green & Sons. 1904.

IN his preface the author states that "before this work can be of direct practical importance for the diagnosis and treatment of cardiac disease, many questions of a physiological as well as a pharmacological nature will have to be solved. These questions are accordingly stated as plainly as possible." This gives a clue to the character of the book, and after perusing it one experiences a feeling of thankfulness that a dose of digitalis can generally be prescribed (perhaps more or less empirically) with some confidence, as the attempt to apply the mass of fact and argument this volume contains to any given case might be rather bewildering.

The book opens with a discussion of the theory of the myogenic action of the heart, in which the author is a strong believer.

This is followed by a description of the physiological types of arhythmia. The "extra-systole" and disturbances in stimulus conduction, contractility and excitability are discussed. Clinical types of arhythmia are thereafter examined and compared with the physiological types.

It is along such lines that any real advance in cardiac diagnosis and therapeutics will be made. The work will be of the greatest interest to devotees of the cardiograph and sphygmograph, but should be helpful to any clinician. It is illustrated by a large number of tracings which are carefully analysed. The author's interpretations may be questioned in some cases, but they are always suggestive.

In some parts, especially in the earlier chapters, the translation seems to be more literal than graceful, but perhaps that is a fault on the right side.

Obstetric and Gynecological Nursing. By EDWARD P. DAVIS. A.M., M.D., Professor of Obstetrics in the Jefferson Medical College, Philadelphia, and in the Philadelphia Polyclinic; Obstetrician to the Jefferson and Polyclinic Hospitals; Obstetrician and Gynecologist to the Philadelphia Hospital. Second edition, revised. 12mo, pp. 402. Philadelphia, New York, London: W. B. Saunders & Company. 1904. Price 8s. net.

THIS is a thoroughly sound handbook of obstetric and gynecological nursing, and will no doubt be welcomed by the nurses training under Professor Davis' supervision in the Philadelphia hospitals; but the methods, the materials, the nomenclature, and to some extent the medicines are transatlantic and are therefore unfamiliar to British practice. Any nurse training for obstetric or gynecological work in this country may indeed profit by reading over several of the chapters in this book, but for examinations and practice she will be wise if she rely rather upon the works which reflect British methods.

Nineteen chapters are given to obstetric and fourteen to gynecological nursing; there are forty-nine illustrations; and there is a useful appendix on dietary and on the preparation of surgical supplies.

List of Books Received

From Baillière, Tindall & Cox.

Medical Monograph Series. No. x. *Cleft Palate and Hare Lip.* By Edmund Owen. Price 2s. 6d.

Medical Monograph Series. No. ix. *Adenoids.* By Wyatt Wingrave. Price 2s. 6d.

From Smithsonian Institution.

Manhattan Eye and Ear Hospital Reports.

Transactions of the College of Physicians of Philadelphia. 1903.

From The Scientific Press.

How to become a Certified Midwife. By E. L. C. Appel. Price 1s.

From John Bale & Son.

On the Extraction Operation, with reference to the use of the Elevator. By G. Mulready Neevil.

From Sidney Appleton.

The Care and Feeding of Children. By Emmet Holt. With Introduction by Eric Pritchard. Third Edition. Price 2s.

From Williams & Norgate.

The Sternum. By A. Melville Paterson. Price 10s.

From H. Ründig.

Le Ventre. By Dr M. Bourcart and Dr F. Cantru. Price 10 francs.

From Smith, Elder & Co.

Index of Symptoms. By R. W. Leftwich. Price 6s.

From William Green & Son.

Arhythmia of the Heart. By N. F. Wenckebach, Professor of Medicine, Groningen. Translated by Thomas Snowball.

From J. B. Lippincott.

International Clinics. Edited by A. O. J. Kelly, A.M., M.D., Philadelphia. Vol. i. Fourteenth Series.

From C. Griffin & Co., Ltd.

A Manual of Ambulance. By J. Scott Riddell. Price 4s.

A Treatise on Applied Anatomy for House Surgeons, etc. By Edward H. Taylor. Price 30s.

From J. & A. Churchill.

A Manual of Surgical Diagnosis. By James Berry. Price 6s.

Uric Acid: an Epitome of the Subject. By Alexander Haig. Price 2s. 6d.

Clinical Lectures on Mental Diseases. By T. S. Clouston. Price 14s.

Development and Anatomy of the Prostate Gland. By W. G. Richardson. Price 10s. 6d.

A Manual of the Practice of Medicine. By Frederick Taylor. Price 15s.

Clinical Diagnosis: Bacteriology. By Alfred C. Coles. Price 8s.

Beri-Beri; its Symptoms and Symptomatic Treatment. An Essay. By Percy Netherville Gerrard. Price 2s. 6d.

Extracts from Beri-Beri, etc. Price 1s. 6d.

From J. Wright & Co.

Golden Rules of Anæsthesia. By R. J. Probyn Williams. Price 1s.

Our Baby: for Mothers and Nurses. By Mrs J. Langton Hewer. Ninth Edition. Price 1s. 6d. paper, 2s. 6d. cloth.

From Rebman & Co., Ltd.

Toldt's Anatomy: Splanchnology. Part iv. Price 9s. 6d.

Toldt's Anatomy; Angeiology. Part v. Price 13s. 6d.

A Manual of Fever Nursing. By Reynold Webb Wilcox. Price 1 dollar.

Health and Disease in Relation to Marriage and the Married State. By Senator and Kaminer. Two Vols. Price 30s. cloth, 35s. half-leather.

From W. B. Saunders.

A Text-Book of Clinical Anatomy. By Daniel N. Eisendrath. Price 21s.

Diseases of the Intestines and Peritoneum; Nothnagel's Practice of Medicine. By Dr Hermann Nothnagel of Vienna. Price 21s.

Obstetrics and Gynecologic Nursing. By Edward P. Davis. Second Revised Edition. Price 8s.

A Text-Book of Pathology. By Joseph M'Farland. Price 21s.

From G. Steinheil.

La Radiothérapie. By Dr J. Belot. Price 15 francs.

Chirurgie Orthopedique. By Prof. Paul Berger and Dr S. Banzet. Price 20 francs.

From Cassell & Co.

Serums, Vaccines and Toxines in Treatment and Diagnosis. By W. Cecil Bosanquet.

The Student's Handbook of Surgical Operations. By Sir Frederick Treves. Price 7s. 6d.

From Young J. Pentland.

The Nervous Affections of the Heart. By George Alexander Gibson.

All Communications—including **BOOKS** *for* **REVIEW** *and* **EXCHANGE JOURNALS**—*are to be addressed to* THE EDITORS, 7 *Manor Place, Edinburgh.*

THE SCOTTISH
MEDICAL AND SURGICAL
JOURNAL

AN INTRODUCTION TO MODERN THEORIES OF IMMUNITY

By D. A. WELSH, M.A., M.D., F.R.C.P. (Edin.),
Professor of Pathology, University of Sydney

(*Continued from page* 287)

PART II.—THEORIES OF IMMUNITY FROM INFECTION.

IT is essential now to discriminate between two main types of bacterial action in the production of disease and of tissue reaction in the development of immunity. In the small group of diseases represented by tetanus and diphtheria, the causal bacilli are remarkably restricted to the site of inoculation, and the lesions due to their presence are almost invariably single or localised, and insignificant. In diphtheria the lesion may derive a fortuitous importance from the accident of its anatomical position, but in the main the specific lesion may be regarded merely as the local manufactory of toxin, which, entering the circulation, becomes attached to certain tissues and may cause serious damage. In artificial culture these bacteria freely elaborate similar toxins which diffuse into the medium and are then readily separable. Repeated introduction of the isolated toxin within a living animal may lead to a condition of immunity by the progressive development of substances which are capable of neutralising the toxin. The details of this process and the theoretical principles involved have already been considered.

A much larger group of pathogenic bacteria appears to have a different mode of action. The specific lesions in which the

bacteria congregate are usually either multiple, as in typhoid fever and tuberculosis, or extensive, as in cholera, pneumonia, and plague, or generalised, as in the various forms of septicæmia, and are also usually of grave import. Within the body of a susceptible animal powerful toxins may be elaborated, which are capable of producing profound general disturbance, fever, delirium, coma, prostration, cardiac failure, wasting and widespread degenerative changes in tissue cells. But, when grown outside the body, these bacteria fail to form toxic substances in the medium at least to any great extent, and the injection of the separated bacterial products is of little or no effect either in producing toxic symptoms or in affording protection. It is found, however, that the introduction of the bacteria themselves, at first in a dead or devitalised condition, and later in a living or virulent state, may lead to the evolution of substances which are capable of antagonising the bacteria. The animal may then be said to possess an anti-microbic serum, which may or may not be also antitoxic, and the condition may be called an immunity from infection, as contrasted with the immunity from intoxication attainable in the former group.

Antagonism of tissues to bacteria (*bacteriolysis*).—When bacteria are introduced into the animal body, not only may antitoxins be called forth, but a host of other anti-bodies also, which are directed mainly against the bacteria, and include substances which disintegrate and destroy them (bacteriolysins) substances which agglutinate them and also immobilise motile forms (agglutinins), and many other bodies known and unknown. Just as in the former group of diseases (tetanus and diphtheria) the animal body becomes immune when it can effectively deal with the toxin, so in the larger group under consideration (typhoid, cholera, plague, etc.) an animal will in all likelihood be sufficiently protected when its tissues can withstand and destroy the invading bacteria. Hence the bacteriolysins form an important constituent of any anti-microbic serum, and, indeed, so far as we yet know, bacteriolysis is the one essential factor in the production of immunity from infection. This process, then, has the first and greatest claim on our attention.

If a guinea-pig receive injections first of dead cholera germs and ultimately of living virulent microbes, its serum

acquires the capacity, among many others, which it does not naturally possess, of actually destroying living cholera microbes when brought into contact with them. This destructive (lysogenic) action may take place within the animal body or outside it, and is known as Pfeiffer's reaction. Two other facts have an important bearing. If the serum of a guinea-pig, immunised in this way against living cholera germs, be heated for an hour at 70° C., then it is no longer able to destroy them (C. Frænkel and Sobernheim). Hence some factor essential to the disintegration of the bacteria has been eliminated, probably, since it is lost by exposure to a comparatively low temperature, some relatively unstable anti-body, or component of the anti-body, has deen destroyed. But the bactericidal property is not wholly lost, since, if to this heated serum from an immunised guinea-pig there be added fresh serum from an ordinary non-immune guinea-pig, then the mixture recovers its bacteriolytic power (Bordet). In other words the fresh serum from the non-immunised animal appears to contain the substance of which the serum of the immunised animal was deprived by heating, and this substance is essential to the destruction of the bacteria.

Two bodies, then, are concerned in the process of bacteriolysis. One is relatively stable, not readily destroyed by heat, and, in the case under consideration, present only in the serum of the immunised animal. It may be termed the "intermediary." The other is relatively unstable, easily destroyed by heat, and effectively present in the serum of the non-immune animal also. It is known as the "complement."[1] From a multitude of facts which we need not consider in detail, there is reason to believe that the destruction of the bacterium is ultimately due to the complement and not to the intermediary, and that the former cannot act without the intervention of the latter. The intermediary by itself has no bactericidal power, the complement by itself cannot reach the bacterium, but, when both are present, the intermediary fulfils the important part of linking the destructive complement to the susceptible bacterium, and bacteriolysis then follows.

[1] The term "intermediary" includes both the immune body and the intermediate body (Zwischenkörper) of Ehrlich, and also the following:—Amboceptor, go-between, mediator, fixative, sensibiliser, sensitiser, preparative, desmon. The term "complement" is synonymous with addiment, alexine, or cytase.

Ehrlich has extended his theory of intermolecular reactions to include this process also. It may be explained on his hypothesis by assuming that the intermediary-molecule has two atom-groups (affinities) of the haptophore order—one capable of combining with corresponding atom-groups (receptors) of bacterial molecules, the other capable of saturation by the haptophorous affinity of the complement. Whereas the complement-molecule possesses two atom-groups neither of which is able to unite directly with molecules of bacterial protoplasm; one of them, however, being analogous to the toxophorous group of a toxin-molecule, can, when the complement is otherwise anchored to the bacterial cell, compass its destruction; the other, being haptophorous, can unite with the corresponding group of the intermediary, and thus indirectly with the susceptible bacterium. Just as anti-toxic serum differs from natural serum in containing an excess of antitoxin, which is capable of saturating the combining affinity of the toxin and so of preventing the union of toxin with tissue cell which is the first condition of toxic action, so anti-microbic serum, so far as its destructive action on bacteria is concerned, differs from natural serum in containing an excess of the intermediary, which is capable of combining with the bacterial cell and with the complement and so of binding the complement to the bacterium, which is the first condition of bactericidal action.

Ehrlich accounts for the excess of intermediary in an anti-microbic serum in much the same way as he explains the excess of antitoxin in an antitoxic serum. In the latter case the molecules of toxin, in virtue of their close relationship with the natural nutriment of the cell, become attached to it through the medium of special receptors whose function it is to fix nutrient molecules. The receptors thus engaged with toxin molecules are rendered useless, so that fresh receptors are formed to make good the loss, and, under the repeated stimulus of successive doses of toxin, the receptors may be reproduced in such excess that they are cast off into the lymph and blood stream as molecules of antitoxin. Now, bacteria may also be regarded as akin to certain food-stuffs, but their molecules are presented in a form that does not admit of their being so easily assimilated by the cell as is the case with the more simple

toxin. Hence it is assumed that certain cells are equipped with more complex receptors to enable them to deal with such more refractory molecules, and that, for this purpose, the cell-receptors (or amboceptors, as they have been termed by Ehrlich) possess two haptophore groups—the one capable of combining with the molecule to be ingested, the other capable of attaching an independent body, the analogue of the complement, and so of bringing to the aid of the cell a more powerful destructive agent. It may serve to make the hypothesis more intelligible if we speak of the complementary body provisionally as a ferment, and say that the cell-receptor with its two affinities first fixes the recalcitrant molecule and then brings to bear on it a ferment capable of its dissolution and digestion. It is not unreasonable to suppose that in some such way as this certain of the more complex molecules of food-stuffs may be made available for tissue nutrition. It must not be inferred, however, that the anti-microbic complement is in reality a ferment. There is, indeed, much evidence to the contrary, although the result of its action on a susceptible molecule may not be dissimilar to the effect of a ferment on a fermentible molecule.

In accordance with this conception of tissue nutrition, the phenomena of immunisation against bacteria may be stated in the following terms. In the presence of a cell capable of dealing with kindred molecules, it may be in presence of a leucocyte, molecules of bacterial protoplasm become engaged with one affinity of the complex cell-receptors, and, resisting dissolution by the complement, they render, for the time being, the cell-receptors useless. Regeneration of fresh receptors to supply the deficiency then occurs, and ultimately, owing to the multiplication or renewed invasion of bacteria, there is an over-production of receptors, the excess being cast off from the cell. Hence there appears in the lymph and blood an increasing number of free receptors which so far retain the character originally possessed by them as integral portions of a living cell as to be equipped with two haptophore groups—the one capable of attachment to molecules of the bacteria, the other capable of linking the destructive complement to them. In other words, the excess of intermediaries in a bactericidal serum consists of the free

receptors of cells capable of engaging the bacteria, just as antitoxin molecules are the free receptors of cells capable of fixing the toxin.

It is a fact of the utmost practical importance, and one to which we shall again refer, that in the process of immunisation against bacteria the regeneration of intermediary appears to be independent of the regeneration of complement, and that the over-production of the former proceeds more rapidly and more abundantly than the over-production of the latter. So that the result may be a great excess of intermediary with little or no excess of complement, and that indeed is the usual result. Most anti-microbic sera, therefore, do not contain a sufficiency of complement to enable them to exercise their full bactericidal power. When a non-immune animal receives a dose of the immune serum, the requisite additional complement may to some extent be supplied by that naturally present in its tissues, but the uncertainty of the source of supply of complement constitutes a serious obstacle to the satisfactory therapeutic use of anti-microbic sera.

Since bacteria are destroyed within the animal body through their presumed relationship to the food of certain cells, it is not surprising to find that similar anti-bodies exist naturally in certain sera, probably being stimulated by certain foods. Most natural sera are to some extent bactericidal, natural intermediaries co-existing with natural complements. Nor is it surprising to find that the manner of feeding of an animal conditions its susceptibility to infection, flesh-eaters being more resistant than vegetable-eaters. What is surprising is the fact that the serum of a resistant animal may have little or no bactericidal power, while the serum of a susceptible animal may possess that property in a high degree. A discussion of this anomaly, however, is beyond our scope.

Antagonism of tissues to other alien cells (hæmolysis, and cytolysis in general).—It is natural to enquire if bacterial cells and products are the only bodies capable of evoking this marvellous inter-molecular activity. Since they are supposed to possess this property in virtue of their relationship to the nutriment of certain cells, it is also natural to expect that other bodies, similarly related, should be endowed with a

similar capacity. We have already mentioned snake venom, ricin, and even rennin as possessing the power of calling forth appropriate anti-bodies. But the question opens up an immensely wider field, for not only bacteria but many other cells are capable of eliciting this remarkable response from the cells of the living body.

Take the case of the red blood-cells. It has long been known that the blood-serum of certain species of animals exercises a powerful solvent action on the red cells of other species. The serum of dog's blood, for example, can dissolve the red cells of the guinea-pig. This is spoken of as the hæmolytic action of dog's serum on guinea-pig's red blood-cells, and the dog's serum is said to contain a hæmolysin analogous to the bacteriolysins which we have just considered. A small interchange of blood may prove fatal when effected between unrelated species, as in the example just given, yet no untoward result may follow even a large interchange of blood between closely related species, between the dog and wolf, for example (Landois). The recognition of this fact led to the early abandonment of transfusion from animals to man in surgical practice, though the nature of the hæmolysis was not understood. But the analogy goes still further, for, just as bacteriolysins may be developed in a serum hitherto free of them by injecting appropriate bacteria, so hæmolysins may be produced in a serum hitherto devoid of them by injecting suitable hæmocytes. Thus the serum of the horse may be transfused in large quantities into the rabbit without destruction of the rabbit's red blood-cells, but, if the horse be treated with repeated injections of rabbit's red cells, as in the process of immunisation, then there begins to appear in its serum a hæmolysin for rabbit's blood, so that the serum of a horse thus treated has acquired the property, which it does not naturally possess, of destroying the rabbit's red blood-cells, and transfusion of a small amount is fatal to the rabbit (Belfanti and Carbone). In a definite and perfectly intelligible sense, therefore, the horse may be "immunised" against the rabbit's red blood-cells. It may be stated as a general rule that the repeated introduction of alien hæmocytes within the body of a living animal leads to the development of a serum antagonistic to hæmocytes of the same species as those

employed in the injections, or reinforces the antagonism if the serum was naturally hæmolytic to them.

When the process of hæmolysis is further analysed, it is found to be closely analogous to that of bacteriolysis. Indeed, the details of the inter-molecular reactions and affinities concerned were first worked out for hæmocytes, since they could more readily be studied in test-tubes, and then found applicable to bacteria (Bordet). For the dissolution of hæmocytes, as for the disintegration of bacteria, two bodies are required. One is the "intermediary," and the other is the "complement." The further details of the process may be gathered from what has already been said regarding anti-microbic sera, the words "hæmocyte" and "hæmolysis" being substituted for "bacterium" and "bacteriolysis." For not only are the general phenomena of hæmolysis strictly comparable with those of bacteriolysis, but so also are the theoretical explanations of the facts.

This, however, is but the threshold of the inquiry, for, when similar experiments were made with other cells, it was found that they, too, were dealt with by the animal body after a similar fashion, and that similar anti-bodies directed specially against them were produced, the chief condition being that the cells should be taken from an animal of a species different from that into which they were introduced. If an animal receives repeated injections of alien liver cells, then its serum develops the corresponding hepatolysin (analogous to the bacteriolysins and hæmolysins already considered), so that it becomes capable of destroying liver cells of the type used in the injections, and, if introduced into another animal of the species from which the liver cells were obtained, it is capable of disintegrating the cells of its liver (Delezenne). Similarly the introduction of spermatozoa gives rise to anti-bodies capable of immobilising, though not of actually destroying, such spermatozoa (Landsteiner, Metchnikoff, and others). Injections into an alien animal of leucocytes (Metchnikoff), tracheal epithelium (Von Dungern), nerve cells (Metchnikoff), renal cells (Lindenmann), and thyroid cells (Mankowski) have also been found to produce sera capable of acting on such cells somewhat in the manner of a hæmolytic serum on the corresponding red blood-cells, so

that specific neuro-lysins, leuco-lysins, nephro-lysins and thyreo-lysins are developed. Moreover, the mechanism of these destructive actions appears to be similar to that of hæmolysis, the dissolution of the cells being affected by appropriate complements linked to them by appropriate intermediaries. Hence the suggestion has been made that even cancer may be created by appropriate anti-epithelial sera. These considerations serve to reveal something of the infinite variety and exceeding nicety of adjustment that characterise the inter-molecular reactions elicited by the introduction of alien cells within the animal body.

But the cells of the animal body are continually being destroyed and replaced, and yet the corresponding "lysins" are not produced. Nor has it been found possible by any experiment to produce an auto-lysin, in other words, an agent capable of disintegrating the cells of the animal in which it was produced. If a goat receive injections of the blood of other goats, it may develop a hæmolysin for other goats' blood, but never for its own blood (Ehrlich). The very necessary natural provision whereby auto-lysins are not produced by the incessant wear and tear of the tissues has been termed by Ehrlich the "horror autotoxicus." But this control mechanism may occasionally fail. Michaeli records the case of a woman who, after an extensive internal hæmorrhage, suffered from hæmoglobinuria, the suggestion being that an auto-hæmolysin was developed by the excessive disintegration of her own extravasated blood (Bulloch). The term auto-intoxication is not unfamiliar, and it may be that self-generated cellular poisons are really responsible for many familiar diseases, including anæmias, hæmoglobinurias, chronic inflammations, intoxications, and cell-degenerations. A most suggestive opening for organo-therapy is hereby indicated.

Antagonism of bacteria to tissues (*intoxication*).—Such inter-molecular affinities and reactions have no meaning apart from the living cell in which they ultimately originate. They are essentially the expression of a vital reaction induced in a living cell by the presence of some alien cell, living or dead, bacterial or animal, and the reactions by which immunity from infection is attained are now recognised to be merely a particular application of a great biological process whereby the living cell

is enabled to destroy or digest alien cells. Now bacteria, when they enter the body and multiply in the tissues, are living cells, and the cells of the body are alien to them. Why, then, should not the living bacterial cell react in accordance with this general biological law and produce anti-bodies specially directed against tissue cells, just as certain cells of the body react to bacteria and produce antagonists to them? The suggestion that the invading cell might similarly react to its environment was first made by W. H. Welch in the Huxley Lecture for 1902. It is conceivable that bacterial cells should be equipped, as we assume certain tissue cells to be, with receptors of similar complexity. Such receptors would possess two affinities, one capable of engaging a corresponding receptor of a tissue cell, the other capable of uniting with a destructive complement which would thus be enabled to attack the cell. By repeated engagements some bacterial receptors would be put out of action, and the bacterial cell stimulated to the production of more. Ultimately an over-production would occur and the bacterial receptors be shed, still retaining the property, which they originally possessed as component parts of the bacterial structure, of fixing a destructive complement to the cells of the tissue which called them forth. In other words, the free bacterial receptors would act as intermediaries capable of fixing a hostile complement to tissue cells, just as in bacteriolysis the free receptors of tissue cells may act as intermediaries capable of attaching a destructive complement to the bacteria.

On this hypothesis the profound intoxication which may undoubtedly occur in the group of diseases represented by typhoid, cholera, plague, and pneumonia would depend, not upon the elaboration of simple toxins like those of diphtheria and tetanus, nor upon the liberation of intra-cellular toxins by dead or dying bacteria, though the latter may be contributory to a relatively small extent, but upon the continued life and vital reaction of the bacteria. This conception is much more in harmony with the phenomena of infection than the assumption that toxins are liberated only on the death and disintegration of the bacterial cell. The further fact that cultures of such bacteria are usually of slight toxicity receives also adequate explanation. Regarded in this light, the contest between

bacteria and their host becomes a race for immunity, the bacteria striving to attain immunity from hostile tissue cells, and the latter seeking protection from the noxious bacteria. Bearing in mind the myriads of bacteria that may be concerned in a given infection, and the fact that they may outnumber the cells of any one tissue of the body, we can realise something of the overwhelming reaction of which they are capable.

The general toxic effects of typhoid bacilli, cholera spirilla, and the like bacteria, therefore, appear to be due to a complex poison of the nature of a bacteriolysin or hæmolysin. The intermediary, as we have seen, is supplied by cast-off bacterial receptors; the requisite complement may be supplied by the bacteria themselves, or may exist naturally in the body of the infected animal, which would then from its own constitution supply the substance which ultimately leads to its undoing. Recent work on snake venom has demonstrated that its mode of action is more complex than that of the simple toxins (diphtheria and tetanus), and is strictly comparable with that of the other bacterial toxins assumed by Welch to be elaborated within the living body. For the work of Flexner and Noguchi and of Preston Kyes shows that the effective constituents of venom are not toxins, as had previously been supposed, but intermediate bodies, which in virtue of their twofold combining affinities have the power of bringing destructive agents (complements) into touch with susceptible tissue cells, the complements being supplied by the victim. The venom by itself is harmless; the complements within the susceptible animal are also harmless, until the introduction of the venom supplies the link by which alone they can operate. That the venom should find the elements necessary to complete its destructive action in the tissue of the affected animal is a phenomenon remarkable as an instance of evolutionary adaptation and suggestive as a type of toxic action.

The interest and significance of the action of venom is enhanced by the further fact that it apparently contains an indefinite number of different intermediaries. When one kind of action, say hæmolysis, is compared in animals of different species, it is found that a different intermediate body is required in each case. Certainly in the dog, in the rabbit, and in the guinea-pig the effective intermediaries of the venom are not

interchangeable, and neither are the natural complements concerned. Moreover, in any one animal the venom can bring destructive agents to bear upon many different cells, including hæmal, endothelial, and nerve cells, and this it does probably by the intervention of a special intermediary for each type of cell, the complement also probably differing. How far such intermediaries are interchangeable and how far specific for each tissue is uncertain. From the phenomena which follow snake-bite, it would appear that different tissues have a maximum affinity for different intermediaries, since special tissues are selected by the venom when it has freely entered the circulation. But it would also appear that the various intermediaries are capable of saturation by affinities other than those of maximum attraction, since one of the most efficient practical remedies consists in wrapping an elastic bandage round the limb, proximal to the bite, until the intermediaries of the venom, thus confined among indifferent tissues, are more or less fully satisfied and their toxic action has been expended on relatively unimportant structures.

That anti-bodies may be developed from bacteria was demonstrated by the observations of Ainley Walker. He found that bacteria became more virulent when grown on the serum of an animal immunised against them, in other words, that bacteria could thus be immunised against their immune serum. He argued that the immune serum contained an excess of free intermediary, one affinity of which was capable of saturating a corresponding affinity in molecules of the bacterium; that these bacterial affinities, or receptors, being thus engaged with the excess of free intermediary, became useless to the microbe, were regenerated in excess, and ultimately cast off into the medium as free bacterial receptors. Hence, so far as the medium was concerned, it became flooded with free bacterial receptors which were capable of neutralising one affinity of the intermediary, so that it could no longer combine with bacteria, the free bacterial receptors thus acting as anti-intermediaries and diminishing the protective value of the serum. And, so far as the bacteria were concerned, they had by repeated stimulation acquired the power of producing in excess receptors for the intermediary and of discharging such receptors as free anti-intermediaries. When these bacteria were injected into a

living animal, they were protected by their own free receptors (anti-intermediaries) from the intermediaries of the animal's body, in other words, they were rendered more virulent. These considerations afford an explanation of the well-known fact that the virulence of a bacterium may be exalted by the method of passage through a series of susceptible animals, as originally designed by Pasteur.

It is well known that very many bacteria in artificial culture may develop bodies capable of dissolving hæmocytes and occasionally leucocytes. The bacterial hæmolysins are of simpler constitution than those we have considered, resembling rather the toxins of tetanus and diphtheria. They derive their interest and importance from their wide distribution, being formed by the bacteria, among many others, of tetanus, diphtheria, typhoid, plague, pneumonia and suppuration, and from the frequent association with these infections of secondary anæmia, and, more rarely, of hæmoglobinuria. In a recent case of tetanus in a boy eleven years old, under the care of Dr Scot Skirving, profuse hæmoglobinuria set in for three days before death, probably from the presence of the hæmolytic constituent (tetano-lysin), occasionally associated with the neuro-toxic constituent (tetano-spasmin), of crude tetanus toxin, as described by Ehrlich and Madsen. The further fact that even saprophytic bacteria may elaborate powerful hæmolysins is most significant in view of Hunter's theory of oral sepsis and intestinal intoxication in relation to pernicious and other obscure anæmias (Welch).

Part III.—Theories of Immunity from Infection.

Concerning agglutinins and precipitins.—Among the substances called forth by the entrance of bacteria within the living body are the agglutinins which have the property of agglutinating and clumping bacteria of the type concerned in their production. But the phenomenon is a general one, since agglutinins are developed in connection with non-motile as well as with motile forms, and in connection with cells other than bacteria, many hæmolytic sera being also agglutinative

towards the corresponding hæmocytes. The very remarkable bodies, known as precipitins are developed by the introduction within an animal of certain albuminous fluids, including blood serum, milk, the white and yolk of egg, and bacterial culture media, and their action is shown by the production of a turbidity or precipitate when the serum of the animal thus treated is added to the albuminous fluid that called them forth. It is convenient to consider both substances together, since they are in many respects similar, though, so far as we know, not identical, and since the processes of agglutination and precipitation appear to depend ultimately upon similar intermolecular reactions.

In this relation we must recall what we have already said regarding Ehrlich's theory of cell nutrition and its bearing on the intermolecular reactions concerned in processes of antagonism. When nutritive molecules of simple constitution are presented to certain cells, they are taken up by simple cell-receptors equipped solely with one haptophore group. These constitute Ehrlich's receptors of the first order. They are concerned in the fixation of molecules of simple toxin, and when liberated from the cell form molecules of antitoxin. We have seen that, in the actual bodily presence of bacteria and other alien cells, other and more complex cell-receptors are required. They constitute Ehrlich's receptors of the third order, and possess two haptophore groups, one capable of union with molecules of the alien cell, the other capable of linking a destructive (or digestive) complement to them. When discharged from the cell, they form the intermediate bodies concerned in processes of bacteriolysis, hæmolysis, and cell-disintegration in general. But other molecules of food may present difficulties of assimilation intermediate between those presented by molecules of the class of simple toxins and those presented by molecules of alien cells. They may be incapable of direct assimilation by the cell, but the requisite preparation or digestion may be accomplished by molecules of the cell itself without the intervention of a separate complement. For this purpose Ehrlich assumes that cell-molecules are furnished with receptors of the second order. Such receptors possess one unsatisfied affinity of the haptophore type capable of fixing the nutritive molecule, but in addition they

possess, as part of their structure, a destructive or ferment-like atom-group, capable of procuring the molecule for assimilation and comparable with the toxophore group of the complement. In suitable circumstances they, too, may be formed in excess and discharged from the cell. Now it is found that agglutinating and precipitating sera can be rendered inactive by heat, but cannot have their activity restored by the addition of the corresponding natural sera. Hence agglutinins and precipitins may be regarded as free receptors of this class. Each possess one combining affinity capable of uniting in the one case with the agglutinable substance of the appropriate cell, in the other case with the precipitable substance of the appropriate albuminous molecule. Each possesses in addition an atom-complex of the toxophore order, representing the agglutinating group of the agglutinin and the precipitating group of the precipitin respectively. But the agglutinating atom-group is unable to act until the agglutinin has, through its haptophore group, entered into combination with the corresponding agglutinable substance. This extremely superficial statement, however, gives little idea of the obscure and complex phenomena concerned in the ultimate mechanism of agglutination and precipitation, though, for our present purpose, it must suffice.

Other facts are known regarding them comparable to some extent with those already considered in relation to toxins and bacteriolysins. In all anti-bodies, so far as is known, the atom-complex of the toxophore order is less stable than that of the haptophore order, and tends to lose its power of affective action. Hence toxin degenerates to toxoid, complement to complementoid, agglutinin to agglutinoid, and precipitin to precipitoid. In this degenerate state agglutinoid is still capable of combining with the agglutinable substance of susceptible bacteria, though incapable of producing agglutination. Indeed, by engaging the molecules of agglutinable substance, it can protect bacteria from the action of agglutinin and thus inhibit agglutination. Since agglutinins, and at a later stage agglutinoids, may be formed in culture media, an important source of error is apparent. In like manner precipitoids may inhibit precipitation. In certain conditions there have been found anti-agglutinin, though not bacterial anti-agglutinin, and anti-precipitin which are capable of neutralising the correspond-

ing agglutinin and precipitin, and again of inhibiting the respective phenomena, though for a different reason.

It is important to note that, as a general rule, the development of agglutinin in an immune serum proceeds along with that of intermediary, nevertheless, the agglutinative power of a serum bears no necessary relation to its bactericidal value. Indeed some remarkable divergences exist. Sera may be prepared which are agglutinative, but not bactericidal, and others which are bactericidal but not agglutinative. Similar contradictions obtain in regard to natural sera. The natural serum of the rat, which is susceptible to anthrax, is bactericidal but not agglutinative to anthrax bacilli, while the natural serum of the insusceptible dog is agglutinative but not bactericidal (Ritchie). A patient dying of typhoid fever, presumably from exhaustion of bactericidal capacity, may have a powerfully agglutinative serum, and the serum of a convalescent may give only a slight reaction. The relation of precipitin to hæmolysin is equally indeterminate.

The practical interest of agglutinins and precipitins centres round the question of their specificity. Like all other antibodies they are directed specially against the particular form of substance that called them forth, but they appear to have a wider range of effective action and are less rigorously specific. The elaborate researches of Nuttall, embodying the results of 16,000 precipitin tests, have done much to determine the nature and limits of this specificity, and have incidentally revealed a most interesting series of blood relationships in the animal kingdom. Two illustrative examples may be taken. When a rabbit receives repeated injections of horse's blood, then its serum begins to develop a precipitin, which produces its maximum effect only on horses' blood. It also produces a distinct but less marked effect on other equine bloods (zebra and donkey), an insignificant effect on the blood of some other ungulates (ox and sheep), and a negative effect on all other animals tested, including other mammals. Similarly a precipitin prepared against human serum gives a maximum precipitate only with human blood, a marked reaction with that of the anthropoid apes (Simiidae), a less marked reaction with that of the baboons (Cercopithecidæ), a negligible reaction with that of other monkeys (Cebidæ and Hapalidæ), and a negative

reaction with that of the lemurs (Lemuridæ) and all other animals tested, including mammals. When, however, the precipitin was tested in stronger concentration, the reactions were less defined, and precipitates were obtained with blood from lemurs and some other mammals. Hence the precipitin test may be of great value in determining the nature of blood-stains in medico-legal cases (Nuttall) just as the agglutinin test may assist in distinguishing bacterial species.

These facts have a most important bearing on the vexed question of the specificity of the agglutinins. It is now known that, like the precipitins, they are not strictly specific and that the limits of their specific antagonism are governed by like principles. An anti-typhoid agglutinin, prepared by immunisation against one strain of typhoid bacilli, produces its maximum effect, not against typhoid bacilli in general, but against the special strain employed in its preparation. It can, however, agglutinate other strains of typhoid bacilli, though less powerfully. When used in suitable dilution, an agglutinin prepared against one bacterial species will not agglutinate other allied forms, but in concentrated solution it may. These facts, together with the possible presence of aggutinin or agglutinoid in the culture medium, and the possible absence or poverty of agglutinin in the immune serum, emphasise the need for caution in interpreting the results of the test.

Nature and limits of specific antagonism.—It is important to emphasise the fact that all these inter-molecular reactions are specific. A given toxin introduced within the body of a living animal calls forth an antitoxin which is capable of neutralising that toxin, and, as a rule, that toxin alone. A given bacterium, in similar circumstances, calls forth a host of anti-bodies (lysins, agglutinins, etc.) which affect these bacteria, and, as a rule, these bacteria alone. But, though many anti-bodies appear to be absolutely specific, others, as we have seen, are only relatively specific. In general terms we may say that the anti-body, developed by immunisation with albuminous molecules in cellular form or otherwise, is specially directed against molecules identical with those that stimulated its production, but may manifest a lesser antagonism towards other closely related molecules. The relationship in question is a biological relationship usually of so subtle a nature as to wholly elude expression

in terms of known chemical and physical data. It is impossible, for example, by any chemical or physical process to recognise a distinction between the hæmocytes or the sera of most allied species, and yet they may usually be distinguished with certainty by means of their specific hæmolysins or precipitins.

Ehrlich's theory practically comes to this, that the mechanism by which the animal body protects itself against, or reacts to, alien cells and certain substances is, in reality, an adaptation of its nutritive or metabolic mechanism. But he assumes that tissue cells possess an indefinite number of fixed receptors, and that an invading molecule elicits an anti-body simply because it possesses an affinity capable of satisfying one particular form of cell-receptor and no other. He further assumes that this is a purely accidental coincidence and presupposes that there already exists another molecule (a nutritive molecule) with an absolutely identical affinity for which this particular cell-receptor is specially designed. Every alien molecule, capable of originating an anti-body, is thus assumed to have a nutritive double. Now, we cannot certainly trace the origin of all anti-bodies, but there is evidence that bacteriolysins and hæmolysins are formed from leucocytes, whether from the same or from different leucocytes is immaterial to our argument. We are, therefore, asked to assume that a leucocyte is equipped with an indefinite number of very definite nutritive receptors, which, by a remarkable coincidence, also possess affinities for atom-groups of every pathogenic bacterium, of every species of hæmocyte, and probably of many other alien molecules. The coincidence is certainly remarkable, and there is this further objection that, if one receptor out of an indefinite number becomes engaged with an alien molecule, the damage to the cell economy would be negligible, and the necessity for the renewed regeneration of similar receptors is not very urgent. The presumption of a rigid arrangement of the atom-complexes that constitute nutritive receptors, the consequent assumption of an indefinite number of different receptors in relation to one kind of cell, and the further assumption of an equally indefinite number of accidental coincidences between affinities of alien molecules and affinities of nutritive molecules, make it difficult to reconcile this aspect of the theory with the known facts of specific antagonism.

Nor is it easy to give any very satisfactory explanation. We must remember, however, that it is the reaction of living matter that is in question. It is not unreasonable to suppose that living cells are capable of subtle adaptations to meet the unceasing changes in their environment, and in particular that a living cell is capable of adjusting its receptors in accordance with an external stimulus, in other words, of rearranging its atom-complexes to correspond with those of an encountering molecule. But the cell-receptors will not receive every molecule presented to them, only those for which they can be adapted. Within these limits, however, there may be an indefinite number of possible rearrangements, and hence a corresponding number of different, though closely related, molecules with which they may combine. In a quiescent state the cell-receptor is capable of an infinite number of atom-groupings, but the particular form assumed at any one time will be determined by the special affinities of the molecules presented to them. When a number of receptors are engaged with molecules of one kind, it may be that the cell is rendered incapable of further rearrangement of its receptors for molecules of another kind, and all the more likely is this to occur if the engaging molecules are of somewhat unusual constitution, as in the case of toxins and bacteria. The receptors then become useless. But what is regenerated to make good the loss? Apparently not receptors (atom-complexes) possessing all their original capacity for rearrangement, but only atom-complexes identical with those engaged by the alien molecule; at all events only the latter are cast off as the specific anti-bodies. The regenerated receptors thus have impressed upon them the specific limitations and affinities for which they were originally adapted by the vital reaction of the cell in presence of the alien molecule. After all, this is no explanation, only a restatement of what we know must take place, but it makes the development of anti-bodies depend, not upon an accidental identity, but upon an essential relationship, and yet a difference, between affinities of alien and of nutritive molecules, and the greater this difference, so long as the living cell can adjust its receptors for engagement, the more restricted the limits of the specific antagonism.

Therapeutic indications.—It is comparatively easy to render

an animal immune to the action of a toxin or a bacterium; it is difficult to transfer this immunity to an already infected animal. Protection is better than cure. In dealing with tetanus antitoxin we saw that there were theoretical reasons for anticipating the failures that have unfortunately been too often realised in fact, and we are now in a position to understand why treatment of our second group of bacterial diseases, in which protection has to be sought specially against the bacteria themselves, and where, therefore, anti-microbic sera are required, should be still more unsatisfactory and uncertain. In the destruction of bacteria two bodies are concerned, the intermediary and the complement, and, since there are three chemical affinities, all of which must be satisfied before any bactericidal action can take place, the chances of failure are increased. It must also be borne in mind that the bactericidal complement is not a ferment. It is not capable of indefinitely originating destructive processes without sensible loss; on the contrary, it becomes used up together with the intermediary; in other words, there must be a certain quantitive relation between intermediary and complement in order to produce a maximum effect.

We have seen that in processes of immunisation the development of intermediary proceeds more rapidly than that of complement, so that an immune serum rarely or never contains a sufficiency of complement to render effective the excess of intermediary. Moreover, on being kept, the relatively unstable complement tends to degenerate and ultimately to disappear (Ainley Walker), so that an immune serum, withdrawn from an animal, rapidly loses its little store of complement, or complementoid may be formed. Now complementoid bears the same relation to complement as toxoid does to toxin; that is to say, the relatively unstable destructive, or toxic, affinity has degenerated, while the more stable combining affinity has persisted. The effect of introducing complementoid along with intermediary into an infected animal might be that some of the bacterial receptors would become engaged, through the intermediary, with molecules of complementoid, which, having lost their destructive atom-groups, would be harmless, and, in proportion to the number of receptors thus engaged, the bacteria would be protected against the action of the true complement.

Since, however, the combining affinity of the complement is usually also lost or impaired, an anti-microbic serum may, for clinical purposes, be regarded as devoid of complement, and simply as containing an excess of intermediary. The complement, therefore, must be supplied by the patient.

Now the patient might possess enough complement to effectively destroy all the invading bacteria, and yet the therapeutic action of the immune serum might be frustrated (1) by the unsuitability of the intermediary introduced, or (2) by its defective or excessive quantity.

(1). That the intermediary of the immune serum might not be adapted for linking a natural complement of man to the infecting bacteria is readily intelligible when we recall the narrow limits within which specific anti-bodies react. Fortunately, however, although the intermediaries of anti-microbic sera appear to be almost absolutely specific as regards their capacity for union with bacteria, an anti-typhoid intermediary being unable to replace an anti-cholera intermediary, yet they are capable of linking to the susceptible bacteria more than one effective complement, at all events an effective complement from more than one kind of animal. But, though complements from several different sources may be effective, they are not all equally effective. A lock may be opened by several keys, but its own key fits it best (Fischer). As a rule, the specific intermediaries of an immune serum have a maximum affinity for the complements of animals of the same species as that in which the immune serum was developed, and may have little or no attraction for the complements of unrelated species. But most anti-microbic sera are obtained from animals unrelated to man except through general mammalian attributes. It is not surprising, then, that their intermediaries should occasionally fail to combine with human complements or should combine only incompletely.

(2). That too little immune serum, involving a deficiency of intermediary, should fail to cure is readily intelligible, but that too much serum, involving an excess of intermediary, should do more harm than good is not at first sight obvious. But the fact is beyond question. For, on testing the effect of varying amounts of intermediary upon quantities of complement and of bacteria as nearly as possible constant, Neisser and

Wechsberg found that up to a certain point all the bacteria were not destroyed, the intermediary being in defect. With increasing amounts of intermediary, complete bacteriolysis occurred, but, beyond a certain limit, excess of intermediary produced again an incomplete reaction, the bacteria escaping destruction. This phenomenon is open to various interpretations. If more intermediary be introduced than can be engaged by the bacterial receptors, then, assuming that the complement is evenly distributed among the intermediaries, some of the available complement will be taken up by disengaged intermediaries, and only a small portion may find itself linked to bacteria. If, again, the complement have a greater affinity for a free intermediary than for one already engaged with a bacterium, then excess of intermediary should be still more harmful. The general trend of experiment, however, is to indicate that complement does not unite with intermediary until the latter has become engaged with susceptible cell-receptors, or at least that complement has a greater affinity for attached than for free intermediary. How, then, can excess of intermediary be hurtful? To understand this we must refer to certain observations regarding hæmolytic sera.

Since the phenomena of hæmolysis can be studied in test tubes, it is possible to determine with remarkable exactitude the quantities of the various bodies concerned. For example, the exact amount of intermediary and of complement required to completely hæmolyse a given quantity of corpuscles may be ascertained, and this may be termed the minimum hæmolytic dose. But the combining affinity of intermediary for hæmocytes is not comparable with that of an acid for an alkali. A given quantity of hæmocytes may take up many times the minimum hæmolytic dose of intermediary, the excess to some extent being determined by the amount of intermediary available (Ehrlich and Morgenroth). In such circumstances, when the hæmocytes have combined with several times the minimum hæmolytic dose of intermediary, the amount of complement that can be taken up by them is also correspondingly increased, and, when the hæmocytes are fully saturated with intermediary, the total amount of complement that can be neutralised in their hæmolysis is excessively and disproportionately increased (Muir). In other words, an excess

of intermediary leads to a disproportionate wasting of the complement, and in all probability this statement is also applicable to the phenomena of bacteriolysis (Muir). In presence of excess of intermediary the bacteria would then take up many times the minimum bactericidal dose, and, unless complement were present in even greater excess, some bacteria would be acted on by more complement than was necessary for bacteriolysis, whereas others would escape. Hence the complement may be sufficient, if properly distributed, to produce complete bacteriolysis, and yet the patient may succumb from an overdose of the immune serum. In the administration of anti-toxic sera, on the contrary, excessive doses are indicated in order to elicit the maximum therapeutic effect. But, in our present state of knowledge, or rather of ignorance, extreme caution is necessary in the use of anti-microbic sera.

As another objection to the use of immune sera in large doses must be mentioned the possible development of anti-immune bodies. Although anti-antitoxin is unknown, both anti-intermediary and anti-complement may be produced, and the more distant the relationship between the immune and the infected animal, the more likely are they to be formed, probably not after a single dose of the immune serum, but possibly after several.

The intermediary of the immune serum may be eminently suitable; the dose may be so regulated as to elicit the maximum effect of the available complement: yet the patient may die from defect of complement. It is apparently hopeless, in the meantime, to look for an artificial source of complement unless from the transfusion of an identical blood, that is, from a healthy to an infected person. Artificial increments of complement have been produced in animals by the introduction of substances which stimulate leucocytosis, but for practical purposes all that we can do is to husband the natural store of complement by the maintenance of good health and by good feeding. The influence of feeding is well shown by contrasting the bactericidal power of the blood in breast-fed and in bottle-fed infants, the former being more than twice as powerful as the latter (Moro). On the other hand, the gradual disappearance of complement in conditions of mal-

nutrition may be correlated with the frequency of terminal infections, and the general exhaustion of the complement in many infective diseases may predispose to relapses and to subsequent infections. The action of various poisons, including phosphorus and alcohol, may also diminish the complement-content, and the readiness with which alcoholic subjects succumb to pneumonia and to other infective diseases is probably directly traceable to this cause.

The possible therapeutic value of protective inoculation by vaccines has been emphasised by Grünbaum. Vaccines, of course, contain, not the anti-bodies of immune sera, but substances which can stimulate the production of anti-bodies. They are, therefore, essentially preventive and not curative. But vaccination is not immediately protective. The first effect may be a transitory diminution of resistance. For the cell-receptors, being engaged with vaccine-molecules, are liable to be overwhelmed by any immediate great increase of toxic substance, so that the vital reaction on which depends the development of anti-bodies may not take place. Hence, for example, inoculation with anti-typhoid vaccine should be performed some weeks before the anticipated exposure to infection. But, in the course of an infective disease, the introduction of a vaccine may be beneficial, since the invading bacteria may have destroyed or impaired the reaction of the tissues in which they have lodged to such a degree that anti-bodies are no longer produced by them, and yet there may be other tissues capable of forming anti-bodies but not stimulated by the bacteria. The injection of the vaccine might be successful in producing a reaction in such intact tissues and materially contribute to the development of bactericidal bodies. The lesions of typhoid fever and of tuberculosis, for example, involve extensive local necrosis of tissue, in which the bacilli are concentrated, and dead or devitalised tissues are obviously incapable of further reaction. Hence the introduction of the less virulent anti-typhoid vaccine, or of tuberculin, may be of value in tapping some source of anti-bodies not yet exhausted. It is hardly necessary to add that such treatment should not be undertaken without a full appreciation of its attendant perils, and, in particular, of the risk of reinforcing the original infection.

Other theories of immunity.—Other theories of immunity are essentially modifications and adaptations of the dominant theory of Ehrlich, and of these the chief have been suggested by Bordet, and by Metchnikoff. Bordet, recognising the difficulty of explaining the interaction of intermediary and complement with susceptible cells in terms of simple chemical laws, does not admit that the intermediary can act as a chemical bond of union between complement and cell. On his view the intermediary acts as a mordant which prepares or sensitises the cell for the reception and action of the complement. Moreover, while admitting specific differences among intermediaries, he does not recognise, as Ehrlich does, corresponding specific differences among complements. Metchnikoff, who for many years has strenuously upheld the phagocytic theory of immunity, now with much ingenuity and resource traces the origin of Ehrlich's anti-bodies to phagocytic cells. It would take too long for us to follow the brilliant work of Metchnikoff and of the many other observers who support this hypothesis ; we must be content to indicate that certain leucocytes appear to be the main source of bactericidal substances. Metchnikoff holds that the intermediaries of an unimmunised animal are confined within its phagocytes, but that during immunisation some of the excess of intermediary is found free in the plasma. Complement, on the other hand, he maintains, is found only within phagocytes, unless it be liberated by disintegration of these cells. Hence bacteriolysis, and the dissolution of alien cells in general, takes place only within appropriate phagocytes. Since, however, in most infections phagocytes are abundantly broken down, and presumably, therefore, bactericidal bodies liberated, it seems unnecessary to insist, as Metchnikoff does, that processes of cell-destruction are essentially intra-cellular.

These matters of detail are insignificant beside the fact that Metchnikoff's theory corroborates, from an entirely different point of view, the principle, which we have already emphasised, that bacteriolysis is but a particular application of a general biological process, the reaction of the living body to foreign cells and certain substances, and that this process in turn appears to be only a specialised act of nutrition. In the lower forms of life digestion and protection are effected by the same cell, and indeed phagocytosis is identical with one aspect of

digestion. In process of evolution, however, the digestive functions appear to have been relegated to specialised hypoblastic cells of the alimentary tract, while leucocytes and certain other cells have been set apart for protection against those alien cells to invasion by which the animal body is continually exposed. Even in the higher animals, however, this differentiation must be stated with reservation, since, having regard to the leucocytosis of digestion, we must admit a possible digestive function of leucocytes. Besides their highly practical bearing, modern theories of immunity have thus the greatest scientific interest from the suggestions they offer regarding the ultimate mechanism of many chemical, biological and physiological phenomena, including complex intermolecular reactions, and processes of cell-nutrition and protection, both of which must be incessantly maintained in every living organism from the lowliest to the highest.

Addendum.—I am not aware of any word in the language that has a connotation equivalent to "anti-body," which exactly expresses the idea to be conveyed, but is most objectionable as a hybrid. The terms "antidote" and "antagonist" have too definite and particular a reference. My colleague, Professor Woodhouse, however, has kindly suggested the word "antion" from the Greek, ἀντίος. In the sense merely of "something opposed to, or directed against," the term "antion" would be the exact equivalent of "anti-body," and appears to meet a real want. But in a paper that was designedly introductory I hesitated to embody a newly-coined word.

COLLATERAL PARALYSIS THE RESULT OF CEREBRAL TRAUMA

By J. HOGARTH PRINGLE, M.B., F.R.C.S. Eng.,
Surgeon, Glasgow Royal Infirmary

THE term "Collateral" has been applied to those cases of paralysis due to cerebral lesion in which the lesion and the paralysis are apparently on the same side, instead of being "crossed," or "contra-lateral," as is usual. It is a condition which is of the utmost importance to the practical surgeon: so that it may be worth while to record a case of what I think was an example of this state which was under my care.

J. B., aged 58, was brought during the evening to the

Glasgow Royal Infirmary in a state of coma. There was no history of any injury to be obtained, but as there was found to be a deep depression of the occipital bone he was admitted to the surgical house.

It was stated by a daughter of the patient that he had gone out to his work as usual at 5 A.M. on the morning of the day of his admission, apparently in good health; but that after remaining at work for 1½ hours he left, saying to a mate that he did not feel well. He went home by tram car and on arriving there had a "dazed look," was put to bed, and became unconscious. His friends had observed that during this process his right upper and lower extremities became "stiff."

On admission there was found a transverse gutter-like depression of the skull in the region of the occipital protuberance. No bleeding from the ears or nose had occurred, but there was a very slight bruising of the right eyelids. There was no subconjunctival hæmorrhage and no proptosis. The right pupil was small and its reaction doubtful; the left eyeball was shrunken and functionless in consequence of an old injury.

Respiration was slow and stertorous, with puffing of the cheeks. Pulse slow and full, the arteries very atheromatous and rigid.

The right limbs were slightly rigid, the left were not: when stimulated by pinching or pricking he at once moved the left limbs but never moved the right. He was never seen to make any spontaneous movement of any limb. The facial muscles were not apparently involved. The urine drawn off by catheter contained albumen with granular and hyaline casts.

The patient was seen by me soon after admission. I could not discover any local signs of a fracture of the skull beyond the occipital depression, which did not appear to me to be of recent origin. I looked on the case as probably one of cerebral hæmorrhage which I thought was in the left hemisphere, and suggested that the skull depression was an old-standing fracture. (His wife, who was not seen until the day after his admission, informed us that twenty years previously he had been treated in another hospital for a fracture of the skull.)

The patient never recovered consciousness and died the following day.

Post-mortem.—There was consolidation of the lower lobe of the right lung, atheroma of the mitral and aortic curtains and the coronary vessels. The kidneys granular from chronic interstitial nephritis; the liver and spleen both showed some congestion.

In the skull there was a fissure fracture which commenced just anterior to the right parietal eminence, ran downwards and forwards, bifurcating into two limbs, one ending in the middle fossa at the sphenoidal fissure, the other in the anterior fossa in the orbital roof.

There was no extra-dural hæmorrhage, no hæmorrhage over the left hemisphere and no laceration of that side of the brain; but there was an extensive laceration of the right frontal and temporo-sphenoidal lobes, with a large effusion of blood in the right middle and anterior fossæ which extended well upwards over the surface of the right cerebral hemisphere.

No hæmorrhage was found in the substance of the brain anywhere, and no injury in the neighbourhood of the fourth ventricle.

The gutter-like depression in the occipital bone was found to be due to an old fracture. Examination of the medulla did not show any obvious abnormality of the decussation.

Shortly afterwards I met with a short record of a case that had been under the care of Mr Mansell Moullin (*Lancet*, 1893, vol. ii. p. 1251). "A stevedore (æt. 43) received a blow on the right side of the head but continued work for three hours, then became faint and ultimately comatose, and was soon after admitted to the London Hospital. He had paralysis of the right facial muscles, and the right extremities were rigid; a week later he was trephined over the left side but without any lesion being found. He died the following day, and post-mortem a subarachnoid clot which covered the surface of the hemisphere was found on the right side; there was no fracture of the skull."

This report was read before the Clinical Society of London, and in the discussion which followed Mr Hulke referred to a case which had been under his care (*Lancet*, vol. ii., 1883, p. 814). The patient had received a blow on the right temple

which stunned him. After working for three days he took to his bed, and on the fourteenth day after the injury was admitted to hospital. Five days later he became lethargic, and while he spontaneously moved the left limbs, "a nip excited scarcely any reflex movement of the right limbs"; six days later spastic rigidity of the left arm was observed; he was trephined over the right temple, and three to four drachms of "brown flocculent fluid" escaped from the subdural space.

Although this case is referred to by Ledderhose as possibly an example of collateral paralysis, I do not think it ought to be included. As the patient happily recovered, it is impossible to say what, or where, the lesion actually was; doubtless the fluid removed at the operation was the cause of the "spastic rigidity" of the opposite arm, but that it was also the cause of the defective movement of the limbs of the same side of the body seems to me to be improbable.

A most interesting and valuable paper on this subject was published by Professor Ledderhose (*Archiv f. klin. Chir.*, vol. li. p. 316), who had under his care a patient who received a head injury, which was later followed by paralysis of the right facial muscles and of both right extremities; he trephined over the left side but did not find any lesion. The patient died twenty-four hours later, and post-mortem a large subdural clot was found on the right side of the skull.

Ledderhose investigated the cases that had been recorded where a collateral paralysis may have been present, and collected a series of thirty-nine, of which twenty-five were due to spontaneous hæmorrhage, six to abscess, and eight to tumours, besides three cases of recent traumatic intracranial hæmorrhage. Of these latter, one recorded by Bonnet is doubtful, but Bauchet's case of extradural meningeal hæmorrhage is apparently a genuine example of collateral paralysis. Ledderhose further publishes the complete history of a case that had been under the care of Dr Carl Lauenstein, of Hamburg, who diagnosed a right meningeal hæmorrhage in a patient who had paralysis of the left limbs, the result of a fall into a ship's hold. Lauenstein trephined over the right side but without finding any clot or hæmorrhage; the patient died, and post-mortem an extra-dural clot on the *left* side 8 × 11 × 1½ cm. was found.

These two cases of Lauenstein and Bauchet are particu-

larly valuable, as they are apparently the only cases where the hæmorrhage was extra-dural. Lauenstein's case was not taken to hospital till the sixth day after the accident, but Bauchet's case was seen from the beginning. I have not access to the original (*Bull. de la Soc. anat. de Paris*, 1852, p. 452), but quoting from the abstract of the case given by Ledderhose, "there was no paralysis at first, then followed loss of movement and sensation in the right arm, then quickly in the right leg, and afterwards of the left side."

Hæmorrhage which is extra-dural is usually much more localised in its effect than when it is subdural, and the consecutive loss of power in the limbs in this case is typical of the characteristic course of the symptoms which are produced by middle meningeal hæmorrhage. To me it appears to be the most convincing case of all those which Ledderhose has collected, and is the only one of the traumatic cases in which the development of the paralysis was observed, unless Hulke's case be included.

When one has to do with a patient who is comatose, and who does not make spontaneous movements of the limbs, one can only resort to stimulation by pinching or pricking the skin, etc., for the purpose of deciding whether there is local paralysis or not. If the limbs of one side of the body respond, while those of the other do not, one is, I think, justified in expecting to find a lesion on the side of the brain opposite to the non-responsive limbs.

In the case of J. B., examination of the movement of the limbs was made in this way several times, always with the same result: the right limbs were never moved while the left limbs were at once. Unfortunately the pupil phenomenon was not available here: the right pupil was small and the left eyeball lost. The small right pupil was not altogether in favour of the lesion being on the right side—had I been inclined to operate I should certainly have exposed the left side of the brain.

The explanation of these cases is by no means clear at present. It is possible that as was suggested by Morgagni they may be due to absence of the usual decussation of the pyramidal tracts, and some support has been given to this theory owing to the observations of Flechsig, who showed

that the number of the fibres of these tracts which decussate is very variable; but Sir William Gowers in referring to this question ("Dis. Nerv. Syst.," vol. ii. p. 75), says, "there is strong reason to believe that where the paths do not decussate in the medulla they cross lower down the spinal cord."

Then it is to be remembered that it occasionally happens that a patient dies who has manifested all the signs of a typical hemiplegia, yet in whose brain after death no lesion to account for the symptoms is discoverable.

In the discussion which followed on the report of Bauchet's case, Cruveilhier suggested that blood effused on one side of the brain might cause so much pressure on the opposite hemisphere against the skull as to produce paralysis. While I have no doubt that paralysis may occur in this manner, it seems probable that both hemispheres would suffer compression and that the paralysis would be bilateral in such a case.

Ledderhose quotes Goltz' experiments on dogs showing that while all the muscles of the body are represented in each hemisphere, the paths for the muscles of the opposite side are easier than for those of the same side; and suggests that some people may have direct motor paths that are easier to use than the indirect, and that in them a brain lesion would cause a collateral paralysis.

Whatever may be the explanation of these cases, and at present my inclination is to look upon them as due to some variation in the decussation of the pyramidal tracts, it is quite certain that these patients will almost invariably die unless the effused blood can be removed by surgery. If, therefore, a surgeon should trephine in such a case over the side indicated by the paralysis and find no cause for it, it seems to me that he is bound to go on to explore the opposite side of the brain.

THE BACTERIOLOGY OF SOFT SORE AND THE ASSOCIATED LYMPHADENITIS

By L. C. PEEL RITCHIE, M.B., F.R.C.S.

IT is now many years since characteristic bacilli were first described in association with the venereal soft sore. Already in 1887 Welander had observed small rod-like organisms in the purulent secretion, though mixed with strepto- and staphylococci. Repeated inoculations on the skin showed, in most instances, the presence of similar bacilli in the pus, frequently independent of any other germs. It is probable that these organisms were identical with those described by Ducrey, after whom they have been named. The value of Ducrey's work lay in the fact that he showed that repeated inoculations on the human skin resulted in the formation of ulcers which, though at first giving evidence of a mixed infection, eventually resulted in a purulent inflammation, the secretion from which showed microscopically the short bacillus in pure culture, while the lesion produced maintained the typical clinical features of ulcus molle. The inoculation seemed to be capable of repetition in perpetuity, and Ducrey carried one series as far as the twenty-fifth generation. Though every available method of artificial cultivation was tried, one and all gave negative results. The experiments, however, provided fairly conclusive evidence as to the identity of the exciting cause of the soft sore. The specific bacilli found in pure growth were stated to be short rods 1,48μ long by 0,5μ broad, rounded at the ends and frequently showing a slight constriction in the middle. They were decolorised by Gram's method, and inoculation on animals gave no result.

Krefting, in 1892, corroborated Ducrey's work and succeeded in finding the organisms in sections of soft sores and chancroid buboes. Further light was thrown on the matter in the same year by Unna, who described bacilli in sections of chancroid ulcers, occurring in chains lying in the lymph spaces of the tissue. To these he gave the name of Streptobacilli. But the differences between these and the bacilli found in the free pus by the previous workers caused Unna to leave the identity of the two forms an open question. Further investigation on his part, however, convinced him of the transition between these sharp-cornered chain bacilli and the rounded forms found on the surface or in the pus. He called attention to the interesting fact that the streptobacilli in the deep layers furnished no attraction to leucocytes and were wholly extracellular, whereas, on the surface of the ulcer an emigration of leucocytes from the vessels was brought about and a phagocytosis ensued, and in

this situation an intracellular location of the organisms was normal and characteristic.

These fundamental researches of Ducrey, Krefting, and Unna, found general confirmation by over two dozen other writers. Though little doubt could remain that the exciting cause of ulcus molle was the Bacillus of Ducrey, it cannot be said that this belief met with general acceptance, and except in the hands of specialists it has certainly not been accorded the diagnostic value to which by comparison the gonococcus has attained. Possibly the absence of positive results by artificial culture has led to a certain amount of scepticism; and many text-books on venereal diseases, even of recent date, cast doubt, not only on the causal relationship of the streptobacillus to ulcus molle, but even on the pathological entity of the condition. Nevertheless the microscopical recognition of the bacillus in cases of this affection is a simple and sufficiently certain procedure, and it is free from the objections of that other method so frequently employed in the past—the test of inoculability. A differential diagnosis can be made between cases of herpes or abrasion or traumatism with ulceration and soft sore: unfortunately, while in cases of possible mixed chancre a positive diagnosis of chancroid is attainable, the more important question of the detection of a primary syphilide is at present beyond our reach by microscopic means.

For the examination the ulcer should be mopped clean with wool to remove the pus lying free on the surface. The base of the ulcer is then scraped with a sterilised platinum needle which has been flattened at the point into a spatula shape. The material thus obtained is spread gently on a cover glass. The bacillus is readily stained but very easily decolorised, and it loses its stain in Gram's method or if treated with alcohol. Carbol-fuchsin, methylene or thionin blue are all good stains, but a method of staining, introduced by Piorkowski for the demonstration of the metachromatic granules in the bacilli isolated by him from the semen of syphilitics, has been found by the writer to be the most useful.[1] By this process the bacilli

[1] The procedure employed by the writer is as follows: The cover glass, well covered with Löffler's methylene blue, is passed to and fro through the Bunsen flame till the stain bubbles freely. It is allowed to cool, rinsed under the tap, and then treated with three per cent. hydrochloric acid in absolute alcohol for exactly five seconds. After thorough rinsing, the film is counterstained with Ziehl's carbol-fuchsin diluted with water, 1:10, for forty seconds. It is then washed, dried, and mounted. This method has been found to be not only a most useful stain for the purpose above mentioned, but is a valuable universal stain for all bacilli which show metachromatic staining, films of pus, etc. For gonococci it is specially useful where these are sparse in number, as they stain a deep blue whether in the cells or not, while the nuclei of the leucocytes are stained red. Epithelial squames take on a faint blue stain, their nuclei appear purplish and the nucleoli a bright blue. The method is not, however, in any way diagnostic.

stain blue or purplish, while the cellular elements, fibrin, and débris forming the chief part of the film appear red. As the bacilli may be present in comparatively small numbers this method of counterstaining renders their recognition a much simpler matter. Preparations made in this way from a typical soft sore show hardly any organism besides the bacillus of Ducrey. This occurs for the most part singly or in small groups as short thin bacilli, either extra- or intra-cellularly. The chain forms are not common among the detached pus cells, but are frequently to be found lying alongside streaks of fibrin, and are thus, when monochromatic staining is employed, apt to be overlooked. The bacilli can be found in the greatest number in or on any of the small clumps of cells which have not been broken up in the preparation, and if a diagnosis is not possible at first sight such a little mass should be sought for. There with the double staining method the bacilli are readily detected, often in very dense groups or in the typical chains, which frequently run several together side by side.

In ordinary practice this microscopical demonstration is sufficient and conclusive, but any scientific doubt with regard to the specific action of this organism may be said to be now settled by the quite recent literature which has appeared claiming success in its cultivation on artificial media. Such results were first obtained by Istmanoff and Aspianz in 1897, using a decoction of human skin with agar, and by Langlet in 1898, using digested human skin with agar and blood. A more important advance was made by Besançon, V. Griffon, and Le Sourd, who used a mixture of one part rabbit blood with two parts liquefied agar. They obtained typical ulcers by inoculation of the colonies resulting and were able from the lesions so produced to again cultivate the bacillus. Their work remained unconfirmed till Tomasczewski repeated the procedure. Blood obtained from the femoral of a rabbit was collected and mixed with fluid agar and sloped in tubes, which were preserved on ice. Soft chancres were excised and thoroughly washed with normal saline; material was then taken from the base and edge of the ulcers, and the tubes inoculated with this were kept at 36 to 38° C. In forty-eight hours in successful cases colonies appeared, grey to black in appearance, glistening and with smooth edges. The colonies could be removed *in toto* with the platinum needle and spread with difficulty on the cover glass. Growth, however, was not constant—in sixteen cases twelve negative results. Growth occurred most readily in the neighbourhood of the condensation water or in this itself forming small flocculi. Growth was also obtained in uncoagulated rabbit's or human blood, but Pfeiffer's blood-agar, Löffler's serum, ascites

fluid, and all ordinary media proved useless. Microscopically the bacilli in the colonies showed great variations in length, some even being so short as to look like cocci, others, however, 2 to 3 μ long. Short chains were to be found, showing a tendency for several to lie side by side. In thc condensation water the bacilli occurred in very much longer chains, but many threads appeared homogeneous, showing no line of division between distinct bacilli. In uncoagulated blood short chains were formed. Occasionally a polar staining was noticeable, but the bacteria as a rule stained evenly throughout. The condensation water proved to be the best of all culture media, but the organisms, however, showed rapid degeneration, and after five or six days were incapable of reinoculation.

Tomasczewski proved the pathogenicity of these cultures in the seventh generation by inoculation on the skin of his abdomen. Typical soft sores resulted, and these contained numerous streptobacilli; re-inoculation on the same area of skin from these ulcers again produced typical chancroids, and an inguinal bubo developed within three weeks, which eventually suppurated. From another series, inoculation of the fifth culture generation produced again the typical ulcus molle, which gave streptobacilli growth on blood-agar, which in turn, at the fifteenth generation, similarly gave rise to chancroid on the abdominal skin. One of the first ulcers was excised and microscopically accorded with the description given by Unna, chain bacilli lying extracellularly in the tissue and lymph spaces. This work may be justly viewed as proving up to the hilt the identity and pathogenic character of Ducrey's bacillus in relation to ulcus molle.

In a subsequent publication Tomasczewski carried his investigations still further in an attempt to solve the bacteriological problems of soft sore buboes, which have hitherto been enveloped in considerable obscurity. He thought to arrive at a more scientific classification with the aid of cultural methods. He examined in all twenty-four buboes, taking the following points as proof of the presence of Ducrey's bacillus: 1. Morphological characteristic appearance of the chain units in the cultures obtained. 2. Their staining properties (Gram negative). 3. Their non-motility in hanging drop. 4. The sterility by inoculation of ordinary media. He classified his results as follows: 1. Buboes of recent origin (3-7 days). These for the most part showed small pus foci in the glands, but microscopically in no case were bacilli found. In two instances, nevertheless, cultures were positive. 2. Buboes of longer standing (2-4 weeks): (*a*) In seven cases the buboes gave cultural proof of the presence of the bacilli. In six of these a distinct increase of the number of

bacilli demonstrable by the microscope followed on the opening of the abscesses, and, in all, the edges of the incision became chancrous. (*b*) In seven cases no growth was obtainable from the pus or tissue of the abscess wall, nor were bacilli to be seen with the microscope, even several days after operation. Of these, two buboes developed after the original ulcers had healed.

Summing up the results, it was found that only 40 per cent. of all the buboes gave a growth of the streptobacilli; but Tomasczewski considers the cultural method affords more conclusive evidence of the origin of these buboes than any other. Ricord had found the pus in only 20 per cent. of venereal buboes to be inoculable on the skin, and that, in most cases, only two or three days after opening. Strauss had expressed the belief that this fact was due to secondary infection of the wound, but Tomasczewski's work would rather seem to confirm the more modern view that the inoculability of bubonic pus is closely bound up with the presence of Ducrey's bacillus, demonstrable in the contents of the abscess. Ricord classified soft sore buboes as virulent and avirulent according as the pus was inoculable or not. It is therefore interesting that in Tomasczewski's cases positive cultures were associated with chancroid infection of the wound. He discusses the identity of causation of the two varieties of bubo, and comes to an affirmative conclusion, on the grounds of the identity of the clinical picture previous to the opening of the bubo; the identical pathological anatomy in both; the absence of the usual organisms of suppuration in both virulent and avirulent varieties; the development of avirulent suppurating buboes subsequent to the healing up of the ulcera mollia; the difference between the pathological condition of virulent buboes and the actual number of streptobacilli found at the moment of incision; and finally, the undoubtedly diminished vitality of the bacilli of many virulent cases, for he had found that cultures from buboes died out sooner than those made from ulcers, and he had observed what he took to be degeneration forms in the gland tissue such as had never been described in chancroids. He does not consider it possible to tell beforehand to which variety any bubo may belong, and thinks that Krefting's observation that virulent buboes soften more rapidly, and appear redder and more tender, was merely coincidence.

Tomasczewski suggests that the death of the bacilli in avirulent buboes may be due to conditions of temperature and the resistance of the gland-tissue. He found by experiment that cultures at a temperature of over 38° C. are incapable of further development. As for the second point, he holds the intactness of the skin-covering as of importance in view of the increase of number of germs after an infective bubo has been

opened, previous indeed to the edges of the wound becoming chancrous. But this opens up an important question in regard to operative procedure, for it is quite conceivable that the exposing of fresh tissue by incision or scraping of the cavity gives to such germs as still remain alive a rejuvenating culture medium. We see in cases of typical ulcus molle that the process of cell necrosis is a self-limiting one, and one has not infrequently observed buboes, whose pus shows the bacilli under the microscope, come to the skin surface, and, after emptying themselves, heal up rapidly without any surface extension of the chancroid destruction. As the growth of bacilli precedes the necrosis, *i.e.* the chancroid appearance of the wound, the phenomenon observed by Tomasczewski is perhaps not surprising. It is also noteworthy that some of the cases in his first group, where the glands not yet broken down were excised *in toto*, were followed by chancroid infection of the wound. It would then seem that a strictly conservative attitude should be adopted with regard to soft sore buboes, since a too early or a too extensive operative interference may only result in the condition which of all others one would wish to avoid.

Tomasczewski discusses the therapeutic aspects of the condition, but does not throw much new light on the subject. He recommends the application of local warmth, but it is questionable if this can have any effect in hindering the growth of the bacilli within the glands. He approves of a conservative treatment at first in the hope that the organism may be able to destroy the bacilli. When operative action is called for, he looks for good results from the employment of a small incision and the injection of an antiseptic agent. To iodoform he accords the first place, conveniently made up with vaseline. It is interesting to note in this connection that, while the streptobacillus can only grow in the presence of oxygen, the most recent research has shown that the antiseptic action of iodoform is only developed in an absence of oxygen in virtue of the formation of di-iodacetylene. When multiple purulent softenings and fistulæ occur, more radical treatment is recommended, long incision, scraping, and removal of the wound edges or total extirpation.

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THE USE OF SULPHUR THERMAL BATHS AND WATERS AS AN AID TO THE ELIMINATION OF LEAD IN THE TREATMENT OF CHRONIC PLUMBISM

By THEODORE A. W. OGG, L.R.C.P.Ed., L.R.C.S.Ed., L.F.P. & S.Glasg.,
Late Honorary Visiting Surgeon, Palmer Hospital, Jarrow-on-Tyne

THE use of baths as one of the prophylactic measures now commonly employed in all lead works where the workers are exposed to the influence of the metal is one of the utmost importance, not only as assuring the personal hygiene of the workers themselves, but also in removing all particles of dust that may have gained access and adhered to the person of the worker during work. Here, however, I mean to deal more with the use of baths, not as a preventive measure, but as a means of aiding elimination of the poison already absorbed and deposited in the tissues ; with special reference to workers in lead factories, where by weekly examination of these workers and attendance on many hundreds of cases, the bulk of my experience was gained. It matters not, of course, in what industry or by what means the lead gains access to the system, the symptoms presented are the same, except that the more severe cases are usually to be seen in lead factories, where the workers are more closely associated with the poison while at work and more rapidly come under its influence. The treatment too is essentially the same.

Lead gains access to the system by three channels, viz., the digestive and respiratory tracts and the skin. Of these the digestive is the chief means by which large quantities may obtain entrance, where the worker is careless in attending to the rules of the factory concerning the washing of his hands before meals, the rinsing of his mouth and care of his teeth, and the smoking and chewing of tobacco during work, etc. The respiratory tract is not, however, to be considered of much less account, as here in the form of fine dust the continued gradual absorption of the poison takes place. The respirator worn by the workers in white lead factories in many instances only covers the mouth and therefore does not exclude this. I have seen a worker who used every care, as well as the extra precaution of wearing two respirators, one over the

other, prove a victim after a short exposure, showing the importance of this channel as a means of entrance where dust is prevalent.

Entrance by the skin is more doubtful and is denied by some, and under ordinary circumstances, the amount of absorption by this channel must be very small, as these lead-workers follow their employment barefooted and with bare arms, these parts coming constantly into contact and being covered with white-lead dust; but the instances of poisoning recorded as occurring due to hair dyes and such like, point to their introduction by the skin and give an example of this mode of entrance, and is an important factor in those who neglect hygienic precautions.

Lead, when once introduced into the system by either or all of these means, enters the blood as an albuminate, and passing quickly to the tissues, remains there in combination in a latent condition with the protoplasm of the cells, acting on them as a poison and arresting their functions, where at times, probably by some metabolic change, it passes rapidly into the circulation and produces toxic symptoms. Usually, however, it is eliminated by the tissues very slowly, and is finally excreted in the urine, bile, sweat and milk, escaping by the bowel in the form of the black sulphide. It is in this process of elimination, therefore, that the use of thermal baths and waters will aid.

First of all, as to the use of iodide of potassium as an eliminent of lead. The iodide is used in increasing doses for this purpose, and after its administration the excretion of lead in the urine is increased. Its mode of action, in short, is to combine with the lead deposited in the tissues, and probably by its action on the cell protoplasm, and the stimulation of the functions of the cells, causes the lead to be liberated, and passing into the circulation in the form of a soluble compound of lead is excreted by the kidneys and secretions, part also being converted into the insoluble iodide of lead. In this way some writers attribute to the iodide a tendency to produce acute symptoms, with increase of symptoms already existing and even sudden death, due to a large quantity of soluble salt being introduced into the circulation.

The use of sulphur baths, and especially the sulphur and sulpho-alkaline baths and waters of various spas, would act as

a powerful accessory to the administration of the iodide as well as in themselves have eliminating properties.

A daily sulphur bath, at a temperature of 95° F., given for twenty minutes to half an hour during the period of treatment, and accompanied by the drinking of the sulphur water, by stimulating metabolism and increasing the functions of the skin and kidneys, would lessen the risk of intoxication by a too rapid entrance into the blood of the poison without a corresponding increase in elimination. More so, the sulphur waters taken internally would not only act by flushing the kidneys and increasing peristalsis, but by passing to the tissues through the blood, as an alkaline sulphide would there favour the formation of an insoluble sulphide of lead, and as this be finally excreted by the kidneys and skin or pass off by the bowel, the latter action being aided if necessary by the addition to the water, while drinking, of a little sodium or magnesium sulphate.

The hot baths cause a determination of blood to the skin, and this increased circulation leads to a stimulation of the functions of the glands and increased secretion, the presence of sulphur contributing to their increased efficacy. The sulphur baths and waters might thus be used alone or in combination with the iodide, and many sulphur waters contain small quantities of iodides.

The waters of Harrogate and Strathpeffer are the chief in this country that contain a large quantity of sulphur and sulphuretted hydrogen, and would be useful for this purpose. Those of Strathpeffer contain a large amount of sulphuretted hydrogen with a small percentage of alkaline sulphide, while Harrogate contains more sodium chloride, hence those of Harrogate are more stimulating. No doubt many sufferers from chronic plumbism would find a visit to a spa impossible, but for them the artificially-prepared waters, though not of equal efficacy to the natural thermal baths and waters, are not to be despised, and can readily be prepared by the addition of the concentrated natural salts, now easily obtained at home.

The drinking of these hot artificially prepared waters, or even of large quantities of ordinary hot water, by promoting the carrying off of waste products from the blood and tissues, and encouraging the free secretion of bile, would prove a valuable prophylactic agent in all factories where the workers

are liable to suffer from the effects of their exposure to the influence of lead. Its mode of action, in short, being to combine with the lead deposited in the tissues, and probably also by its action on the albumen molecules and the stimulation of the functions of the cells, so cause the lead in part to be liberated and pass into the circulation in the form of a soluble compound of lead, while part is directly converted into the insoluble iodide of lead, and so excreted by the kidneys and secretions.

A RESUMÉ OF RECENT LITERATURE ON ECZEMA

By F. GARDINER, M.D., B.Sc., F.R.C.S.

EVEN in these days, when dermatologists are debating whether eczema is a phase of seborrhœa, or again, a mere cutaneous reaction, to the general practitioner it is a common disease which is uncommonly troublesome. Sabouraud (1) summarises the various views thus :—

"1st. Unna considers eczema as a specific parasitic disease.

"2nd. Almost the whole French school consider eczema as a polymorphic skin 'inflammation, symptomatic of an undefined debilitated state.

"3rd. Others consider that the word eczema ought to be applied to that dyscrasia itself of which the outward manifestations are the varied dry, moist, and purulent skin eruptions.

"4th. Still others consider eczema as neither a disease in itself nor a manifestation of a particular state, but a reaction of the skin due to diverse causes. For those, indeed, there is no eczema, only eczematisation."

Each view can be defended by various arguments and each has its own doughty exponent.

Whitfield (2), discussing the first or parasitic theory, emphasises the difficulty of eliminating the surface organisms from cultures; further, he points out that microscopically the primary vesicle is free from any emigrated cells, a fact which, to his mind, is strong evidence that the lesions are not caused by ordinary pyogenic cocci, whilst in addition no organisms have been demonstrated in the vesicle by appropriate staining, although, after rupture, secondary infection at once takes place. Bender, Bockhart, and Gerlach, investigating the effects of staphylococci derived from boils and impetigo, found that the staphylococci free from toxins were inert, but when their toxins

were rubbed into an unhealthy or previously irritated skin a papular eczema was produced. From these and other observations, Whitfield concludes that although germs be on the skin they are not active until there is an abrasion and subsequent outpouring of serum which forms a suitable nidus for their growth.

On the other hand Veiel (3), who studied the micro-organisms of chronic eczema in order to determine whether their nature was parasitic or saprophytic, found staphylococci in early and late stages almost exclusively, and that they were not those of the ordinary skin but pyogenic, he proved by agglutination and hæmolysis.

Thus, although the parasitic nature of eczema is far from being definitely proved, yet many now admit the action of germs as one irritating cause. We fancy that few who have observed the inception and spread of the condition from a septic wound will deny this, even taking into account the irritation produced by surgical dressings. Apropos, it seems to us that too little attention is paid to the effect of these dressings on the surrounding skin, as on several occasions the effect of excessive dressing has been very marked and a widespread eczema might have been avoided by trusting a little more to nature and timely soothing of the skin. It is generally in slight injuries that such accidents happen, and the weeks of torture from eczema is at times more memorable to the patient than his original trivial injury.

With regard to the second class, it represents pretty generally the British teaching, if one couples with it the action of external irritants, but how far the internal economy is at fault and how far reaction from irritation is to blame is still the battle-ground. One has frequent illustrations of the action of external irritants; their character, the locality, and the history at once enable one to label them as baker's eczema, washerwoman's eczema, etc. Plant dermatitis is a condition now more frequently recognised, Primula Obconica in this country, and Rhus Diversicolor (Poison Oak) in America, being well-known offenders. Schwalbe (4) gives a summary of the effects of poison of the latter in almost infinitesimal doses. He considers the active irritant to be an oil which is carried by the hairs of the leaves and stalks; these hairs, which cover lactiferous ducts, stick into the skin glands. Those who are immune are individuals who sweat little and in whom consequently the duct glands are less open.

To return to the constitutional element in eczema, we note that Whitfield lays stress on alimentary disturbances as having the greatest influence, and most practitioners who are treating infants are only too glad to avail themselves of this reason if

only to satisfy an anxious mother; but a local cause can as often be found, whether it be ichthyosis, carbolic soap or dirt. Heubel (5) mentions the case of a baby seven months old suffering from an eczema on which local treatment had no effect, the condition only improving after an excess of salt in the cow's dietary was rectified. Three months later a recurrence of the lesions occurred, and it was again traced to the milk of the cow being altered by excessive salt in its food; further to prove it was no coincidence, he mentions that another child fed on the same milk underwent the same experience.

Gout, especially in England, is often held as blameworthy, but on this point Robinson (6) makes some very pertinent remarks. "Does the presence of uric acid or its compounds ever initiate an eczema? Certainly it is true that quite a number of those who are eczematous have, at the time of our seeing them, some evidence of gout or they relate to us testimony which proves they have the gouty diathesis. The characteristics of all gouty inflammations are threefold: they are sharp, sudden and fugitive. Eczema may be sudden in its onset, but it is not a fugitive condition. Direct investigations in scraping the secretion from any eczematous area and examining the same for urate of soda or uric acid have given negative results. There is one other argument against eczema being symptomatic of gout, which is that the administration of colchicum in cases of eczema does not act as a curative; and so far as has been observed is without any effect." He goes on to turn the tables completely by suggesting that as eczema and gout are commonly associated, and as sufferers from eczema have an imperfect skin, even when at its best, its excretory power will be limited; effete matter will collect in the blood, more work will be thrown on the kidneys, and gout consequently will develop. The statement is a reasonable one if it can be proved that the skin is really defective in its excretory capacity.

An interesting example of the effect of nervous strain is quoted by Whitfield: it is that of a man very much bound up in the scholastic achievements of his sons, who had regular attacks of eczema on his hands when any of these sons were up for a scholarship examination. The eczema subsequently disappeared when the ordeal was safely over.

In every case it is wise to enquire thoroughly into the general health of a patient with eczema, because as Macleod (7) puts it, "any diseased organ or system may be capable, if not of causing a dermatitis, certainly of aggravating it." We would emphasise that "may," because even gross visceral lesions often have absolutely no effect on an eczema.

The third class is represented by Trémolières (8), who holds

that "one does not cure eczema but the eczematous. The eruption, whatever be its direct cause, never appears but in a predisposed subject." Most of us will regard this generalisation as far too sweeping, and the "eczematous" would be difficult to diagnose.

In the fourth class, who consider the disease as a cutaneous reaction to irritation, we find Brocq (9) as an able exponent. In recent papers he has defined eczema as "a prolonged reaction of the skin, accompanied by the production of vesicles," while he divides the condition according to the age of the individual, and finds that the seat of eruption and its character vary with the time of life. Warde (10) gives illustrations of the effects of heat and cold as causative agents in the production of eczema: with the former the vessels are dilated and effusion of lymph is great; with the latter the vessels are contracted and the tissues are drier, therefore the greater strain thrown on the vessels results frequently in the production of hæmorrhages, as in chilblains.

The action of internal irritants is exemplified by Mantoux's (11) report on the effect of coffee given to three eczematous patients, who, amongst others, had previously been some time in hospital. All three developed new spots next day.

These four theories have all able advocates, and we quote Whitfield's conclusion as representing to our mind a fair index of the trend of British opinion.

"Eczema may be caused by external irritants alone, when these are of suitable strength and act for a certain time. Certain skins are from birth of low resisting power, so that their owners are liable to attacks of eczema under circumstances which would not affect normal skins. Other skins have some gross and visible defect, such as ichthyosis or diminished or excessive secretion, which lays them open to more frequent irritation, and they therefore suffer in the same way. By repeated irritation, or more rarely by a single powerful irritation, the resistance of a normal skin may become so lowered that irritants hitherto inefficient become efficient causes of the eruption."

Treatment.—The skin as an excretory organ when incapacitated requires rest in order to undergo repair. One of the finest remedies in heart disease is rest in bed, and its rationale is that it lessens the work of that organ; yet too often it is forgotten that the skin requires just such careful consideration. Certainly in acute generalised eczema it is almost essential, and it often proves beneficial even in slighter cases, as, for instance, when the lower limbs are involved. Macleod puts the facts concisely: "By rest in bed the strain on the skin's activity is lessened and much of the irritation from friction and compression to

which it is subjected in moving about is avoided. Hyperæmia is also reduced, since by means of the horizontal position the strain is taken off the heart, and the tension in the cutaneous blood-vessels is lessened. The temperature of the room can be regulated, and light, non-irritating clothes chosen, so as to reduce pruritus. But one of the most important considerations of all is the facility with which local remedies can then be applied to the patient, and instead of local treatment being carried out in a half-hearted way, the utmost benefit may be derived from it."

As regards internal remedies, we agree with Trémolières that generally they are not indicated until local means fail; he advises their use in the acute widespread inflammatory type and also in old age. In the same article he recommends the use of alkalies where there is any rheumatic or gouty history; cod-liver oil, which is frequently given to strumous individuals, he considers is sometimes responsible for the appearance of new lesions, and on the whole prefers in these a syrup containing a combination of iodine and tannic acid, while in nervous cases valerian and asafœtida have given him the best results. In conclusion, he emphasises the value of intestinal antiseptics, careful dieting, and detailed attention and treatment if necessary of all the emunctories.

In more acute conditions antimony in the form of tartarate, as recommended by Jamieson, or the wine in 10 minim doses every two or three hours, as recommended by Morris, is still used by many.

Brodier (12), who is strong on the virtues of internal medication, finds an important place in his armamentarium for such drugs as quinine, colchicum, digitalis, and ergot; belladonna he uses when there is much exudation, and valerian in adults, bromide of potash in children, sulphonal and trional give him best results in pruritus, nervousness and insomnia. Wise insistence is laid on the evil effects of opium and chloral on skin lesions; while even on the Continent it seems difficult to inculcate the general practitioner to the fact that arsenic is only useful in a limited number of skin eruptions, and that acute and subacute eczema suffer from the exhibition of the drug.

Pruritus is often a very troublesome condition for which drugs are given, and their futility may be explained by the interesting observation of Brönson, who pointed out that it could be accounted for by the morbid anatomical features of the disease—papules, vesicles and pustules, arising as they do in the epidermic layers, being very itchy, while lesions affecting the corium are not so affected.

On the subject of diet there is a general consensus of opinion that a regimen of milk is indicated for a few days at least in

inflammatory eczema, while many recommend a free use of vegetables as part of the diet after recovery; but Whitfield states that he has observed acute attacks on vegetarians only disappear when a diet of meat and hot water was substituted. Besnier is quoted by Trémolières as saying that "the eczematous individuals in general eat too much for their mode of life. Therefore they should be counselled to restrict their diet and to have meat only at one meal." He further would omit fish, veal, pork, cheese, acid vegetables, such as tomatoes, spinach, asparagus, and onions, and alcoholic liquors of any kind.

Local Treatment.—This must depend entirely on the stage of the disease and character of the eruption, and no hard and fast rule can be laid down. In the early acuter stages, Brodier advises a treatment commonly adopted in this country, viz., the application of starch poultices, but in some cases he finds camomile lotion acts better, and in old arthritic cases prefers to use dusting powders of bismuth, talc, zinc oxide, starch, and lycopodium. If the eruption passes the erythematous and papulovesicular stages, Whitfield considers that powders are no longer useful, and lotions which are mildly antiseptic are best, as they allow free drainage. Of these, lead lotion, which is only useful when moist, calamine, which acts even when dry, and ichthyol, not stronger than 3 per cent. in water, are commonly used by him, the addition of 1 per cent. carbolic acid being made if pruritus is severe. On a limited weeping area with œdematous base, as frequently seen near the flexures of the limbs, a solution of ½ to 10 per cent. of silver nitrate or nargol is recommended by Alibert, and has long been in use in this country.

Lyle (13), acting on the parasitic theory, claims successful results in all his cases of weeping eczema by the application of lint soaked in 1 in 2000 biniodide of mercury; the affected parts, he states, become dry, and any remaining patches are again treated, the cure finally being completed by ointments or lotions.

Blake (14), with a similar bactericidal end in view, uses formalin, apparently in 1 per cent. solution, in dry eczemas; and where there is exudation, glutol, which is a combination of formaldehyde and gelatin in formulæ such as—

Glutol, ʒi
Pulv. talci, ad ℥i

Gaucher has obtained excellent results in acute eczema with picric acid 1 per cent. in water. The part previously cleansed by moist applications is painted every two or three days with this, and after each painting is dressed with aseptic wool and

bandaged, the only precaution being that the head must be avoided, as this treatment stains the hair yellow.

The chief difficulty in practice with these strong lotions is, as Jamieson points out, that caking of the secretion takes place, and this has subsequently to be removed by poultices to prevent further suppuration.

Later stages of acute eczema are treated with bland ointments of zinc, bismuth, or salicylic acid, according to the choice of the prescriber.

When the disease is chronic, stronger remedies are required, and these, according to Whitfield, may be classified into these without and these with marked overgrowth of the epidermis and sclerosis of the true skin. For the first, plasters or ointments containing oil of cade, 2 per cent.; pyrogallol, 1 per cent.; or chrysarobin, 4 per cent., may be used, and the strength increased if necessary; but when there is great overgrowth, the chief methods used are the application of a strong 5 to 10 per cent. salicylic acid ointment or plaster, painting with a solution of liq. potassæ, or scrubbing with soft soap. Any of these latter modes produce strong irritation, and therefore subsequent soothing is required by lead plaster, or oleate of zinc ointment.

With Trémolières, oil of cade is first favourite, because, in addition to its intrinsic value, it has no disadvantages of strong odour or staining clothes. He uses it in various forms—pure, mixed with an equal quantity of almond oil, 10 to 50 per cent. in vaseline, 30 per cent. in glycerine of starch, and 50 per cent. in acetone collodion. It must be remembered, however, that its prolonged use may lead to the production of acne.

Gelatine preparations, as originally recommended by Pick and Unna, are now chiefly used to facilitate the application of topical remedies, such as ichthyol or boracic acid, when the patient is walking about; they cannot be used when there is much oozing, as the dissolved gelatine then acts as an irritant. The one in use at the Edinburgh Skin Clinique contains gelatine, 15 parts; zinc oxide, 10 parts; glycerine, 30 parts; water, 40 parts; and to this 2 per cent. ichthyol is subsequently added.

Lastly, in obstinate cases, and some would say in sub-acute cases also, exposures to X-rays have proved of undoubted value. We can, from our own experience, agree with such writers as Stelwagon (15), Williams (16), and Zeisler (17), who have notified many successes. The action of the rays is in this, as in other skin conditions, destructive to new formations and stimulant to healthy tissue growth.

In conclusion, we would sum up by saying that recent research, although it may not have brought to light many new

remedies of value, has taught us how to use the old drugs in a more scientifically accurate manner.

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Meetings of Societies

The Glasgow Medico-Chirurgical Society

THE first meeting of the session 1904-05 was held on Friday, October 7th—the President, Dr Newman, occupying the chair. There was a large attendance.

1. After the transaction of a considerable amount of private business, Dr T. K. Monro showed a cretin (woman), aged 23, who had improved under thyroid treatment. She was born in 1881, and till 1 year of age appeared normal, but by 6 years it was apparent that she was cretinoid. She did not walk or speak, and at 9 years of age was 30 inches in height. The tongue was large and protruded. In May of this year she was admitted to the Glasgow Royal Infirmary and put on thyroid, which had been tried previously. Under this she increased in three months from 41 inches in height to 43, and the tongue got smaller, so that it could be kept inside the teeth. The case presented the usual physical appearances of a cretin, and the thyroid was represented by a mere string-like band.

2. Dr Jas. H. Nicoll showed a female child on whom he had operated two months previously for hydrocephalus by peritoneo-meningeal drainage. In considering any case it had to be kept in mind that the hydrocephalus might be either meningeal or

intra-cerebral; the lines of treatment available were: (*a*) drainage of the ventricles, and drainage through the cortex, both of which were very dangerous on account of sepsis; (*b*) drainage through the roof of the fourth ventricle; (*c*) the infection of irritating fluids, such as Morton's solution; (*d*) peritoneo-meningeal drainage, proposed independently by Dr Nicoll and an American surgeon. He removed a transverse process of a lumbar vertebra, did a laminectomy, opened the peritoneum, and pulled the omentum into the spinal canal, fixing it by stitching. The difficulty was to keep up drainage. Catgut was no good. He had buried glass or rubber tubing and gone back for it later. He could not yet say if the method would prove of value; certainly in the case shown, the head had not lessened in bulk. The case was commented on by Drs Lindsay Steven and Ness, and by the President. Dr Nicoll also showed two boys in which mastoidectomy had been done with a preliminary occlusion of the internal jugular vein. It was strongly recommended that it should be done early in the operation, wherever one suspected a septic thrombus or tubercular caries of the mastoid, to lessen risks of general infection. A full account of Dr Nicoll's views on the subject will be found in his special article in the September issue of the *Scottish Medical and Surgical Journal*. The procedure was warmly criticised by Dr Syme, and defended, in his reply, by the speaker. A large collection of calculi removed by operation were also shown by Dr Nicoll. These included salivary, biliary, pancreatic, intestinal, renal, ureteral, vesical, prostatic, and urethral.

3. Dr Geo. H. Edington read notes on the treatment of tuberculous glands of the neck by excision. He classified them as: (*a*) jugular; (*b*) sub-maxillary; (*c*) sub-mental; (*d*) those in the lower half of the posterior triangle of the neck; (*e*) those below the lobe of the ear; and (*f*) the epi-sternal. Free access was necessary, and as regards the line of incision he followed Kocher's rules. The operation was simple in early cases, but often troublesome in late ones, on account of abscess-formation, sinuses, tacking of the skin, hæmorrhage, etc. Dr Edington then proceeded to deal with some points of practical importance in relation to these contingencies.

Glasgow Clinical and Pathological Society

THE first meeting of the current session was held on October 10—the newly-elected President, Professor Robert Muir, in the chair. There was a good attendance.

1. Dr T. K. Monro showed two cases of the peroneal type

of muscular atrophy from the same family. The first was a boy of 13, who had had measles five years before. Difficulty in walking was noted three years ago, and a peculiar throwing forward of the toes occurred. The gait is stiff also, and there is a little pain at the inside of the knee. The knee-jerks are retained, and sensation generally is unaltered. The electrical reactions are reduced. The other case was a sister, aged 10, who had had measles before three years of age. She could not walk at all, was very nervous, and showed some fibrillary tremor. In neither case was there any ataxia: this distinguished it from Friedreich's disease. As regards the pathology, in some cases the nerves were degenerated, and there was evidently a neuritis. Measles had been blamed. Both the above cases had had it, and three children in the same family had died of it. The President discussed the cases, and Dr Monro replied.

2. Dr Freeland Fergus described a new operation for ectropion, and showed a patient treated by it. Ectropion was generally due to blepharitis marginalis, and he had noticed that the outer third of the conjunctiva was the diseased and hypertrophied part, and that it was clearly marked off from the healthy inner two-thirds. He therefore dissected off the diseased portion and stitched the healthy conjunctiva to the skin edge. The result was good. He had no trouble with the lachrymal duct. Indeed, he often had removed the sac itself without any trouble arising. The paper was discussed by Mr Maylard, and Dr Fergus replied.

3. Dr Fergus also read a short paper on the tests for binocular fixation. Concomitant squint often occurred between one and three years, was convergent or divergent, and, if not treated, left a bad result. It was necessary to educate the form sense in both eyes. Later, cases might occur with no squint, where there was certainly no binocular fixation. For testing and exercising such cases, one might use North's amblyoscope or Landolt's stereoscope. He had himself obtained excellent results from the plastogram (which was shown), which was simple, efficacious, and cheap. It should be used for twenty minutes twice a day.

4. Dr Walker Downie and Dr John H. Teacher showed a specimen of carcinoma of the thyroid gland which had penetrated the trachea. The patient was a mason of 61 years, who had definite symptoms for only six weeks before death, these being cough, pain, breathlessness, and loss of voice. There was also some emaciation. Examination showed a mass well below the cords, projecting into the trachea. The larynx was hyperæmic, and externally the thyroid felt a very little thicker than

in health, especially on the left side. Tracheotomy was performed, but the patient died shortly afterwards. The post-mortem showed distinct enlargement of the left thyroid lobe, and extensive cancerous infiltration into the trachea. There were many enlarged glands locally, and two small secondary deposits were found in the liver. The growth was a very hard scirrhus. Dr Teacher referred to the work of Bland Sutton and Kaufmann on this subject, and said that cancer of the thyroid was a rare disease, especially in an otherwise healthy gland. It was more common in the goitrous thyroid.

5. Dr Rutherfurd described a case of hydronephrosis in a boy of 7, on whom he had operated successfully. At first the case was thought to be a tubercular peritonitis, but when the abdomen was opened a large cyst presented itself; this was tapped, and 200 oz. of fluid drawn off. The posterior peritoneum was incised, and the hydronephrotic sac readily shelled out. A vein was ligatured, but nothing was seen of the renal artery. Recovery was good.

Glasgow Southern Medical Society

THE opening meeting of the 69th session of this Society was held on October 6th—the retiring President, Dr Richmond, in the chair. The following office-bearers were elected for the coming year. Honorary President, Professor H. E. Clark, C.M.G.; President, Dr Jas. Hamilton; Vice-Presidents, Professor Stockman and Professor T. K. Monro; Treasurer, Dr T. Forrest; Secretary, Dr Jas. Weir; Edit.-Secretary, Dr R. W. Forrest; Seal-keeper, Dr Andr. Wauchope. There were also elected extra members of council and the court medical, while Dr C. E. Robertson was once more appointed to act as the Society's representative on the board of the Victoria Infirmary.

Forfarshire Medical Association

THE first ordinary meeting of the Society for the present session was held in the Physiology class-room of the New School of Medicine, Dundee, on Friday, October 7th, at 4 P.M., Dr Rorie in the chair.

Dr M'Vicar showed a boy upon whom he had operated for suppurative peritonitis following appendicitis. The pus was evacuated by means of two incisions in right and left iliac regions. Complete recovery took place at end of three months.

Dr M'Gillivray showed a case of relapsing hyphæma. The

patient, a boy, was operated upon for traumatic cataract in 1901; made a good recovery. A year after blood was discovered in the anterior chamber. Supposed cause was over-exertion at football. Since then there have been several relapses of the hyphæma, at present just recovering from one. A second patient was one from which an unusual calcareous deposit had been removed from the left cornea.

Dr Devereux exhibited and explained the working of Harcourt's chloroform inhaler, which had been in use for several weeks in the Royal Infirmary, and already gave promise of being a valuable means for accurately measuring the amount of chloroform administered and the proper proportion of admixture with air. Dr Buist spoke in its favour from an operator's point of view.

Dr Buist showed a uterus removed *per vaginam* from a nullipara, aged 51. The interesting points were difficulty in diagnosis (an offensive discharge suggested cancer) and large size for removal *per vaginam*. On section it had the appearance of a sloughing fibroid.

Dr M'Vicar showed a stomach with large cancerous tumour of pylorus, removed post-mortem. Examination of the contents of stomach during life showed an absence of hydrochloric acid and pepsin. Microscopic examination of stomach wall showed a diminished mucous lining. No tumour could be felt in life.

Dr Buist, in a paper entitled "The Doctor in Molière," gave an interesting account of the medical man as depicted in his plays. After a rapid survey of the state of medicine and philosophy in the early days of the seventeenth century, he pointed out how the dawn of the age of science had already begun to disperse the mists of Empiricism. Molière, being frequently in attendance at the Court of Louis, and mixing with the physicians and philosophers of the day, had every opportunity of acquiring an extensive knowledge of all that was new, and means for studying the eccentricities of the leading men. He made use of this knowledge in his writings, and by the characters he introduced into his plays, drew a fairly correct picture of the manners and customs of the medical men of the time. Dr Buist illustrated his paper by many humorous quotations from the plays.

Dr M'Vicar read notes on a series of cases of perforative peritonitis associated with appendicitis, rupture of ulcer in typhoid and other lesions in the lower abdomen. He laid stress on the early recognition of pus, and the immediate evacuation of same by operation. The first sign of peritonitis could always be detected by light percussion, an area of dulness varying in extent according to the lesion could always be

made out. This was caused by a protective layer of fibrinous exudation over the peritoneum. This initial dulness usually took a crescentic form, and extended day by day as the inflammation advanced. If pus was formed it could be detected by deep percussion along the line of Poupart's ligament; absolute dulness meant pus. If this dulness increased rapidly, there was danger to the protective barrier of fibrinous lymph, and immediate evacuation of pus was necessary to prevent general suppurative peritonitis. The most favourable cases for operation were those in which the pulse did not rise above 120. A pulse of 140-160 meant a fatal result, even with immediate operation. He considered the best point to open the abdomen was in the right or left iliac region (as in the patient shown). By an incision in the middle line, one frequently missed the exact site of the pus.

Fifeshire Medical Association

THE twenty-third annual general meeting of this Association took place in St Andrews on October 7th. Luncheon was served in the Alexandra Hotel at one o'clock—Prof. Musgrove, St Andrews, President, in the chair. There were also present—Provost Murray, St Andrews; Rev. Robert Scott, Montrose; Prof. Scott Lang, St Andrews; and Dr G. W. Miller, Hon. Secy., Forfarshire Medical Association, as guests; Prof. Macintosh, Drs Huntington, Orr, Richardson and Paton, St Andrews; Dow and Macgregor, Dunfermline; Laidlaw, Ladybank; Orr, Ceres; Constable, Leuchars; Donald, Colinsburgh; Ferguson, Anstruther; Balfour Graham, Leven; Macgregor, Methil; Rorie, Cardenden; Dickson, Lochgelly; Henderson and Macintosh, Kirkcaldy; Macdonald and Douglas, Cupar. After luncheon, the Chairman gave the toast of "The King," and that of "The Guests," the latter of which was responded to by Provost Murray. An adjournment was then made to the Bute Building, where Drs Orr (Tayport) and Sneddon (Cupar) joined the meeting.

The minutes of last meeting having been read and approved, Prof. Musgrove delivered his presidential address on "The Topographical Anatomy of the Thorax and Abdomen." These were illustrated by means of a fine series of models, the work of the late Professor His, of Leipsic, to whose memory the President delivered a graceful panegyric. The models were taken from the cadaver of a youth of fifteen years of age, prepared by the injection of a solution of chromic acid, a method adopted by His in 1878, and which yet compares favourably with the

more modern method of formalin injection. Many points of great practical value—the difference in level of the lung apices, the position of the heart, the oblique position of the spleen, the difference in height of the kidneys, and others—were shown.

Prof. Harris then made a communication on a copy of the "Manual of Anatomy," by Alexander Read, a contemporary of Harvey. This very interesting volume was printed in 1638 in duodecimo, and has on it the initials "C. R.," being in all probability a presentation volume from the author to King Charles I., who, it is known, took much interest in science, and who was a friend and patient of Harvey. The point of historical interest in the book lay in the fact that, although printed some years after Harvey's discovery had been made public, it still contains the ancient Galenical ideas concerning the blood.

The President thanked Prof. Harris in name of the Association for his interesting communication.

The Hon. Treasurer, Dr Macdonald, then exhibited his annual statement of the finances of the Association, which showed a balance in hand of £13, 16s. 8d., being exactly the same as last year, which was considered very satisfactory.

The election of office-bearers was then proceeded with, and the following were elected for the ensuing year:—

President—Dr A. J. Macgregor, Dunfermline.

Vice-President—Dr Norman Walker, Edinburgh.

Council—Drs Orr (Tayport), Dickson (Lochgelly), and Mackenzie (Thornton).

Hon. Treasurer—Dr Macdonald, Cupar.

Hon. Secretary—Dr Douglas, Cupar.

Dr Macdonald then moved a resolution of which notice had been given at the last dinner, namely—"That next year's meetings be held in Thornton." This was seconded by Dr Ferguson, Anstruther, and, after some discussion, was unanimously agreed to.

On the motion of Dr Balfour Graham, a hearty vote of thanks was given to Prof. Musgrove for his very valuable address and for his conduct in the chair.

This concluded the business of the meeting.

Apologies for non-attendance were received from: President Forfarshire Medical Association, Prof. Pettigrew, Drs J. Orr, G. Macdonald, Nicholson, Stewart, T. G. Nasmyth, J. Mackay, Norman Walker, W. Spence, Turnbull, Hardie, Morris, Borrowman, Jack, Laing, Macmillan, K. N. Macdonald, R. Spence, B. Spence, Craine, Fleming, Craig, Veitch, Smith, Curror, Brand, and Gold.

Births and Deaths registered in Eight of the Principal Towns of Scotland during September 1904

DURING the month of September 1904, there were registered in the towns of Glasgow, Edinburgh, Dundee, Aberdeen, Paisley, Leith, Greenock, and Perth, the births of 3844 living children, of whom 1928 were males and 1916 females. These births are equivalent to an annual birth-rate of 27.1 per thousand of the estimated population of these towns. The equivalent annual birth-rate in Leith was 29.3; in Glasgow, 28.4; in Aberdeen, 28.2; in Greenock, 28.1; in Dundee, 26.7; in Paisley, 24.5; in Edinburgh, 24.2; and in Perth, 21.6. The births registered in these eight towns number 483 fewer than in the previous month, and 48 fewer than in September 1903.

Of the total births, 3578 were legitimate, and 266 illegitimate; the illegitimate births were thus 6.9 per cent of the total. In Edinburgh this illegitimate rate was 9.1 per cent.; in Dundee, 8.7; in Perth, 8.3; in Aberdeen, 6.8; in Glasgow, 6.6; in Greenock, 5.0; in Paisley, 3.6; and in Leith, 3.6.

The deaths registered in these towns during the month numbered 2264, which is equal to an annual death-rate of 16.0 per thousand. This rate is 0.7 less than in the previous month, and 0.2 less than for September 1903. The deaths are 188 fewer than in the previous month, and 2 more than in September 1903.

The death-rate for the month was highest in Perth, 20.1; and lowest in Paisley, 13.9. In Greenock, it was 18.3; in Dundee, 17.6; in Glasgow, 16.3; in Aberdeen, 15.3; in Edinburgh, 14.7; and in Leith, 14.2. The rates for Dundee, Leith, Greenock and Perth are more than for August, and for Glasgow, Aberdeen and Paisley less than in August.

Of the 2264 deaths, 841, or 37.1 per cent., were of children of under five years old, and 562, or 24.8 per cent., of persons of over 60. Deaths under five are 118 less than in August; deaths over sixty are 25 more.

Deaths of children under one year numbered 588; they are 60 fewer than in August. The infantile mortality amounted to 141 per thousand births, a rate of 10 less than in August. The infantile mortality in Dundee was 205 per thousand births; in Glasgow, 139; in Leith, 138; in Greenock, 137; in Edinburgh, 134; in Paisley, 133; in Aberdeen, 115; and in Perth, 104.

The seven principal epidemic diseases during the month were the cause of 291 deaths. This is equal to an annual death-

rate of 2.1 per thousand. These deaths are 61 fewer than in August, but 72 more than in September 1903. The death-rate during the month from these epidemic diseases was highest in Greenock, 4.2; and lowest in Perth, 0.7. In Dundee, it was 2.8; in Paisley, 2.5; in Glasgow, 2.2; in Edinburgh, 1.7; in Aberdeen, 1.2: and in Leith, 1.2.

There was one death from smallpox during the month.

Deaths from measles numbered 15, which is 15 fewer than in August. Deaths from scarlet fever numbered 11, the same number as in August. Deaths from hooping-cough numbered 74, which is 38 fewer than in August. Deaths from diphtheria numbered 19; this is 8 more than in August; of the 19, 6 were in Glasgow, 5 in Edinburgh, and 4 in Greenock. Deaths from fevers numbered 30, which is 20 more than in August; of them 28 were due to enteric, 1 to typhus, and 1 to simple continued fever. Of the deaths from enteric fever, 9 were in Greenock, 6 in Glasgow, and 6 in Edinburgh. Deaths from diarrhœas numbered 141, which is 37 fewer than in the previous month.

Deaths from influenza numbered 4, which is the same number as in August, but 4 fewer than in September 1903.

Deaths from puerperal septic conditions were 6; from malignant disease, 148; from apoplexy, 113; from heart disease, 190; from premature birth debility, 65; and from alcoholism, 6. Of the deaths due to malignant disease, 77 were due to carcinoma, and 11 to sarcoma.

Deaths from pneumonia numbered 160, and constituted per cent. of the total deaths; those from bronchitis 97, constituted 4.3 per cent. of the total deaths; and deaths from phthisis 175, and constituted 7.7 per cent. of the total deaths. Deaths from pneumonia are 31 more than in August, from bronchitis 19 more, and from phthisis 8 fewer.

The Meteorological Returns for Eight of the Principal Towns in Scotland for the Month of September 1904

Mean barometric pressure, 30.017 inches; greater than the average for the same month of 1856-1900 by 0.150 inch.
Mean temperature, 53°.6; greater by 0°.1.
Mean daily range of temperature, 14°.3; greater by 1°.0.
Mean humidity, 83 per cent.; being the average.
Rain, number of days, 12; less by 4 days.
Rain, depth in inches, 3.22; less by 0.17 inch.

Wind, mean force (on scale of 0-12), 1.7; less by 0.7.
Wind, direction of: a 6 days' excess of winds from a S.E. quarter.

HENCE the month of September 1904 was characterised by a high mean barometric pressure; an average mean temperature, with a slightly high mean daily range; a slightly low mean rainfall, with an unusually small number of rainy days; a large excess of moderate winds from a S.E. quarter.

The mean barometric pressure was 30.017 inches, or 0.150 inch above the normal. At Edinburgh the sea-level pressure was above 30 inches continuously from 15th to 24th, and also on 1st, 3rd and 4th, from 10th to 12th, and from 27th to 29th. The monthly range was much below the average, the Edinburgh extremes being 30.389 inches on the morning of 23rd, and 29.675 inches on the morning of 30th.

The mean temperature was 53°.6, or 0°.1 above the normal, the days being 0°.5 above and the nights 0°.4 below their respective averages. At none of the chief towns did temperature differ greatly from the average, Edinburgh having the greatest excess, and Perth the greatest defect. No remarkable range of temperature occurred, both maxima and minima falling at most places in the third week of the month, when anticyclonic conditions prevailed. At Fort-William ground frost was noted on 11th, 14th, 15th, 21st, 24th and 29th. The absolute maximum for the chief towns was 70°.8 at Dundee on 7th, and the minimum 35°.0 at Perth on 14th.

The mean rainfall was 3.22 inches, or 5 per cent. below the normal. Paisley had an excess of 25 per cent., and Greenock of 8, whilst the other towns had a shortage, Aberdeen reporting a deficiency of 27 per cent. Hardly any rain fell from 13th to 23rd, and the number of rainy days was unusually small, the totals at most stations being largely accounted for by heavy falls on one or more days. Thus Greenock reported 1.19 inches on 2nd, 0.80 on 4th, 1.00 on 5th, and 1.00 on 29th, whilst on 2nd, 0.86 was registered at Dundee, and 0.79 at Aberdeen. At Edinburgh the aggregate for 24th and 25th was 0.85 inch, or more than half the total for the month. On the 6th the Perthshire rivers were in high flood.

Recent Literature.

CRITICAL SUMMARIES AND ABSTRACTS

MEDICINE

By W. B. DRUMMOND, M.B., C.M., F.R.C.P.,
Extra Physician, Royal Hospital for Sick Children, Edinburgh

THE TREATMENT OF CHRONIC RENAL DISEASE[1]

THE treatment of Chronic Renal Disease formed the chief subject of discussion at the Section of Medicine at the recent Oxford Meeting of the British Medical Association. Several of the speakers did not confine their remarks strictly to the subject of discussion, but referred to various points of interest in etiology, symptomatology, diagnosis and pathology. Sir John W. Moore, especially, explained at some length some recent refinements in diagnostic methods, and some of his remarks may be quoted before passing on to the general subject.

"It may seem a truism," he said, "to state that before we plan a line of treatment in a case of chronic kidney disease it is desirable—indeed essential—not only to make an accurate diagnosis, but also to determine as far as possible the renal sufficiency in general, and even the functional power of each kidney. In their recently-published work on 'Functional Diagnosis of Kidney Disease,' Privat-Docent Leopold Casper and Dr Paul Friedrich Richter, of Berlin, discuss the method of determining renal sufficiency in general under the headings: (1) The elimination of nitrogen; (2) the elimination of chlorides; (3) the determination of the molecular concentration of the urine (cryoscopy); (4) the elimination of artificially-introduced substances (methylene blue); (5) the chemical activity of the kidneys; (6) the toxicity of the urine; (7) the determination of the molecular concentration of the blood. The determination of the functional activity of each kidney depends on the observation of: (1) The concentration of the secretion of the kidneys collected simultaneously and separately; (2) the elimination of nitrogen by each kidney; (3) the 'molecular concentration' of each kidney; (4) the methylene blue test; (5) the phloridzin method.

"A few words of explanation of the expressions 'molecular concentration,' the 'methylene blue test,' and the 'phloridzin method,' may be acceptable. In his admirable 'Clinical

[1] Based on an advance proof of the Proceedings of the Section furnished by the courtesy of the Editor of the *British Medical Journal*.

Handbook of Urine Analysis,' Dr Charles H. Bedford, Professor of Chemistry in the Calcutta Medical College, defines cryoscopy as a means of obtaining from the freezing-point of the blood and urine an indication of the excretory activity of the kidneys. The process, he says, is based on the fact that the greater the number of molecules in solution, the lower is the freezing-point—that is to say, the freezing-point shows the degree of molecular concentration (or, as it is termed, 'osmotic pressure') in the fluid, while the specific gravity shows the weight of solids in solution in it. For example, in blood the freezing-point normally varies only from 0.55° to 0.57° C. below that of distilled water, while the specific gravity varies from 1046 to 1057. So long as even one of the kidneys is healthy, the freezing-point of the blood never falls below 0.56° C. On the other hand, renal inadequacy results in a marked increase in the blood's molecular concentration, and the freezing-point falls below −0.50° C. If the freezing-point is found to be −0.65° or −0.68° C., it would clearly point to inadequate excretion in the case of both kidneys. Professor Bedford claims that in chronic forms of nephritis, and especially in interstitial nephritis, the method of cryoscopy gives valuable indications of the lessened excretory power of the kidneys, and acts in many cases as a danger signal.

"The methylene blue test for the permeability of the kidney consists in the injection of 1 c.cm. of 1 in 20 solution of the aniline derivative, methylene blue, into the gluteus maximus. If the filtering power of the kidneys is unimpaired, the urine passed at the end of half an hour has a pale green colour, and within three or four hours after the injection the colour deepens to a dark green. The coloration finally disappears in normal cases within two days of the experiment.

"Phloridzin—as is well known—is a glucoside, obtained from the bark of the stem and root of the apple, pear, plum and cherry. It possesses the remarkable property of inducing artificial glycosuria in animals to which it is administered. In using it as a test of renal inadequacy it is, of course, necessary to determine whether glucose is already present in the urine. If it is, the test is inapplicable. The phloridzin test consists in injecting subcutaneously 5 mg. of phloridzin dissolved by the aid of sodium carbonate in 20 to 30 minims of water immediately after the patient has emptied the bladder. If the kidneys are adequate, glucose should appear in the urine in half an hour, when its amount may be estimated by Fehling's or by Pavy's method.

"Dr Bedford states that, in acute and subacute parenchy-

matous nephritis, glucose is not excreted, although methylene blue is; in interstitial nephritis (even when there is no albuminuria), the excretion of both methylene blue and of sugar is diminished, or the appearance of the chromogen or sugar is delayed, or the excretion period may be prolonged."

The cryoscope was referred to again by Dr James Barr, who said that for some time he and his assistants had been examining the blood in cases of arterio-sclerosis, and that so far as they had gone, they had invariably found the freezing-point below that of normal blood, irrespective of the condition of the kidneys.

Turning now to the question of treatment, we find amongst the various speakers a general agreement upon the broad lines of treatment of chronic Bright's disease. Several of those who took part in the discussion emphasised the more favourable view which is now taken of the prospects of a patient with albuminuria as compared with thirty years ago. Dr Hale White, who opened the discussion, said that the mere presence of albumin in the urine was of itself of little importance, except as an aid to diagnosis, and that about half the invalids who have albuminuria do not suffer from chronic Bright's disease. All doctors of long experience could call to mind patients who had had albuminuria for twenty years or more without harm.

Diet.—These remarks are of importance with regard to the question of diet. A milk diet is frequently relied upon to reduce albuminuria, but not only, said Dr White, is the symptomatic treatment of albuminuria wrong, but the sufferer from chronic Bright's disease is often the worse for the milk. Farinaceous food is of value, and nitrogenous food should be used sparingly, but several speakers emphasised the necessity of watching the general condition of the patient, and not allowing him to suffer from want of sufficient food. One speaker even advocated the use of egg albumen when the drain of albumen from the system is excessive, and recommended equal parts of egg, water, and whey for cases where milk disagreed. Professor von Noorden said that while a too liberal allowance of meat should never be given, we had an unlimited choice as to the different kinds. Neither clinical experience, nor chemical analysis, nor investigations on metabolism authorise us to give preference to white meat in the treatment of chronic Bright's disease.

Several speakers referred to the value of drinking considerable quantities of water for the purpose of flushing the kidneys. Sir John Moore said the water must be soft water, or distilled water, but did not refer to the gastric and other disturbances which have been alleged to follow a free use of the latter.

Contrexéville water he recommended as enjoying a well deserved reputation in all forms of renal disease.

Sir William Broadbent said that a good tumblerful of water night and morning was of more value as an eliminant than larger quantities taken along with food.

On the other hand, Professor von Noorden referred to the value of restricting the supply of fluid. He held it unnecessary to flush the body of the patient by giving greater quantities of fluid. He also drew attention to the danger to which the heart of the person suffering from Bright's disease is exposed by allowing too large quantities of fluid, and emphasised the benefit which can be drawn, in such cases as well as in diseases of the heart, from a wise limitation of beverages. This thesis had not been without contradiction; Dr Strauss, in Berlin, especially, opposed the results in his investigations on blood. But other researchers had agreed with him—among such he might name Professor Pel in Amsterdam, and Professor Koranyi in Buda-Pesth. His own clinical experience in this matter had in the meantime increased, and he must again emphasise the enormous benefit which many patients may derive from the restriction of fluid, if only 1½ litre daily is allowed. The favourable result on the dilatation of the heart as well as on the asthmatic complaints is most remarkable, even in very advanced stages of the disease.

Exercise.—The last speaker referred also to the value of a certain amount of exercise. He said: "During the last two years I have devoted my attention to a third point—that is, to the influence of systematic muscular exertion on the course of Bright's disease. I do not know what position the practitioner in England takes up on this question, but with us in Germany it is customary to restrain all muscular work as soon as Bright's disease is diagnosed, and many German physicians even go so far as to begin the treatment by putting the patients to bed for several months. I perfectly agree that all fatiguing exertion must be forbidden, but it is certainly not for the benefit of the patient to forbid all muscular exercise; on the contrary, I am of opinion that much good can be done to most by accustoming them to systematic training of the muscles. The consequence will probably be that at first the amount of albumen in the urine rises, but this is only transitory. After a few days, or at longest after the lapse of one or two weeks, it decreases again and becomes often less than before the training began, but I do not insist upon this; more important is it that the state of the heart will greatly improve. I have seen many cases in which the stenocardic complaints, arising before the training after the slightest exertion, totally

disappeared after training. It is thus placed in our power to bring back the sense and feeling of health and strength to many who had given up all hope of a useful life.

"In the training it will be found best to adopt the rules which Dr Oertel has given for the treatment of heart diseases, and it will soon be found that the result in Bright's disease is just as favourable. The beginning is not quite easy, and patients treated in their own homes will hardly overcome the first difficulties. A total failure is then the result; this is the reason why treatment in hospitals or in health resorts is more advisable. Of the watering-places, I prefer those which have at their disposal carbonic-acid water for baths and weak saline springs for drinking cures. According to my experience, the saline springs exert a much stronger influence on the eliminating action of the kidneys and on the clearing of the blood in Bright's disease than do the alkaline waters. There must be combined with these therapeutical factors a carefully-watched training in gymnastics, walking, and climbing. I am sure that most places afford the opportunity for this, but I must say that my own experiences are based on cases treated in Homburg or in my clinic."

Fresh Air.—Fresh air was advocated as favouring elimination by the lungs. A warm atmosphere and warm clothing are necessary, and therefore when expense is no object the cold and damp of a northern winter and spring should be avoided by a sojourn in a warm climate. Sir John Moore recommended Egypt especially, but mentioned also in this connection Algeria, Cyprus and Sicily.

Alcohol.—The value of alcohol was discussed in the opening paper. Dr Hale White regarded high arterial tension as contra-indicating the use of alcohol. On the other hand, he thought alcohol often did good when the heart was feeble and the blood tension low, but the quantity used should be really moderate.

Treatment of Cardio-Vascular Symptoms. — There was a general agreement among the speakers that the main object of treatment was to keep the vascular tension normal. High arterial tension may be reduced by laxatives, the nitrites, the iodides, and a restricted diet. Digitalis is useful in cases where the tension is low. If digitalis seems otherwise indicated in a case where the tension is above the normal, some nitrite or iodide (preferably iodide of soda) should be administered along with it.

Œdema due to cardiac failure is best treated by trying to strengthen the heart. Slight or moderate degrees of it should be treated by posture. In very chronic cases with low blood tension caffeine may be of service, as may also a pill containing one grain each of mercury, powdered digitalis, and powdered

squill. In more severe œdema the most efficient means of getting rid of the fluid was by drainage with Southey's tubes, or by puncturing the legs with needles and then keeping them dependent. In either operation aseptic precautions are essential.

The Value of Eliminative Measures.—The fact that excretion by the kidneys is faulty in chronic Bright's disease indicates not only the necessity of assisting elimination by other channels, but also of withholding anything which it is thought might irritate the kidneys or be excreted with difficulty by these organs. Dr Hale White referred especially to the advisability of refraining from the use of such drugs as carbolic acid, cantharides, and turpentine. Mercury, lead, and digitalis should not be given for a prolonged period. Morphine, although occasionally beneficial in uræmic convulsions, should rarely be given, and sulphonal and trional were also dangerous, as they might induce hæmatoporphysinuria. Dr Saundby stated that in the uræmia of acute nephritis, or that following pregnancy, morphia was less dangerous than in the uræmia of chronic renal disease.

As eliminative agents Sir John Moore recommended benzoate of soda and urotropine. He said that he had again and again seen the drowsiness of impending uræmic coma overcome by 20 gr. doses of the benzoate. Urotropine in 5 gr. doses thrice daily was also of value, but should be given only for a day or two. General dropsy he regarded as itself an eliminant, and stated that uræmic symptoms are much more likely to be encountered in non-dropsical cases.

Uræmia was regarded by most of the speakers as a form of poisoning by some unknown substance. Sir William Broadbent said that his interpretation of uræmic convulsions was that the cortical circulation was arrested. The intracranial pressure is determined by the arterial pressure, and when this intracranial pressure is such that the circulation in the convolutions is interfered with by the pressure against the cranial vault, or when the action of the heart is so weakened that it is incapable of overcoming the resistance here, so that there is a stasis in the cortical circulation, the convulsions take place. He had more than once seen convulsions brought on by a hot air bath, and this he attributed to the depressing effect on the heart. Convulsions indistinguishable from those of uræmia might occur in cases in which there had never been albuminuria or symptoms of chronic renal disease. A case of such convulsions in a patient known to have had very high arterial tension was instanced. When the patient was seen suffering from severe convulsions the heart was much exhausted and the tension had become normal; but acting on the previous knowledge, bleeding was resorted to, the convulsions ceased, and the patient recovered.

The value of bleeding in true uræmic convulsions was admitted by several speakers, and hot air baths, hydragogue purgatives, and diaphoretics were recommended. Pilocarpin some regarded as of great value, but the drug should be administered in small doses on account of its depressant effect. Chloroform may be used to relieve uræmic convulsions, and inhalation of oxygen had been found of value in uræmic cases. In uræmic dyspnœa, nitrite of amyl may prove of service. Vomiting and diarrhœa are to be regarded as eliminative, and should not be checked too rashly.

Other Methods of Treatment.—Dr Hale White hoped that other speakers would state whether they had observed good to follow lumbar puncture in uræmia; whether they had tried the suggestion of MM. Widal and Javil of giving no sodium chloride when œdema is present; whether they had punctured the kidney or fed the patient on renal extract; and whether they had found benefit to follow decapsulation of the kidney. To most of these queries, however, no response was given.

Sir John Moore referred to Professor Renaut's treatment by administrating macerated fresh pork kidneys. He had tried the method in two cases, but with no very definite or satisfactory results.

With regard to *Surgical Treatment*, as to the value of which most of the speakers were very sceptical, Dr David Newman said that there were cases which benefited by surgical interference. He had come to the following conclusions regarding the efficiency of incision of the capsule or of cleavage of the cortex.

1. That the operation gives marked relief to the renal pain of chronic Bright's disease.

2. That in cases of hæmorrhage, in which the bleeding is practically limited to one side, the operation should be recommended, as it has been frequently followed by cessation of the hæmorrhage in chronic Bright's disease.

3. In cases of movable kidney associated with albuminuria, hæmaturia, tube casts, or blood casts, when due to causes resulting from the displacement, after the operation of incision and fixation, these symptoms disappear permanently, but when coincident with chronic Bright's disease only temporary good is effected by operation.

4. Anuria in chronic Bright's disease may be temporarily relieved, and the patient's life prolonged; dropsy and dyspnœa may subside for a time, but cure is not to be looked for in chronic non-infective nephritis as an effect of surgical treatment.

5. That in anuria with uræmic symptoms arising in the course of acute or subacute infective nephritis, free incision of the capsule and cortex, by relieving the tension and congestion

of the parenchyma, enables the organ to resume its function, as shown by active secretion of urine from both kidneys after the operation.

Dr Newman referred very briefly to a valuable series of 26 cases, in a large proportion of which pain and albuminuria had been relieved, these symptoms having permanently disappeared in 11 cases; and, continuing, said:—

"The question of bleeding in cases of uræmic poisoning has been referred to by several speakers, and I simply say in a word that I believe that, either by venesection or by wet cupping over the kidney, it is a mode of treatment of the highest value. There is only one other point I desire to refer to in the treatment of conditions arising from Bright's disease, namely, the method of drawing off serum in cases of anasarca. A method which I have employed is simple and efficacious. I make two parallel incisions through the skin a quarter of an inch long and a quarter of an inch apart. I then take an ordinary glass filler, the bell end of which is 1½ inches in diameter. It, together with 3 feet of rubber tubing, is filled with boracic solution, and the bell of the filler is placed over the incision, and the free end of the rubber tube is carried to a receptacle on the floor. The traction of the column of water is sufficient to maintain the filler in position and to exhaust the serum from the subcutaneous tissue, in some instances at the rate of over one gallon in twenty-four hours. I find this method simpler and more satisfactory than the employment of Southey's tube, in that there is no possibility of blockage taking place."

SURGERY

By HENRY WADE, F.R.C.S.,
Conservator of the Museum of the Royal College of Surgeons of Edinburgh

THE BACTERIOLOGICAL EXAMINATION OF THE BLOOD IN SURGERY

IT is now twenty years since Garré first published his work on the Bacteriological Examination of the Blood in Septic Diseases. Since then many series of observations have been recorded; but, nevertheless, we find Janowski, in a paper published in *Ziegler's Archives* as recently as 1901, stating that "the bacteriological examination of the blood was of problematical value; in every case where a positive result was obtained, it had been proved to be due to a technical error on the part of the observer conducting the investigation," a statement founded on the result of a careful study of the work done during the ten years previous.

We can, however, say, with confidence, that such a sweeping indictment is unwarrantable at the present day. The Bacteriological Examination of the Blood to-day has won for itself a place in surgery of great scientific and clinical value. That such is the case is due to such observers as Bertelsmann, whose most recent contribution to the literature of the subject appears in the *Deutsche Zeitschrift für Chirurgie* for March of this year. His paper on General Infection in Surgical Infective Diseases, to which we refer, forms the basis upon which this abstract is founded.

The task which Bertelsmann set himself was the investigation of the blood of all the cases which were available for his purpose, which manifested signs of local infective disease of any variety. No special class of case was selected, and the absence of all clinical signs and symptoms of general infection was not accepted as a justification for omitting to examine for the presence of bacteria in the blood. Two hundred and sixty blood examinations were made by him in 230 patients. Naturally, all the cases examined were not uncomplicated, pneumonia and tuberculous disease being manifested as complicating factors in some of them. These he discarded, leaving 154 uncomplicated cases. It is the result of the examination of these cases with which we are concerned, and upon which Bertelsmann bases the deductions which he draws from his work. We have already seen that the objection raised against much of the work which had been previously done arose from the presence of technical error in conducting the investigations. The sources of error in conducting any bacteriological investigation are manifold. To those which are common to all, there is added, when the human blood is being examined, one source of error which has been responsible for many failures—the contamination of the blood by skin organisms. This factor, combined with the withdrawal of too small a quantity of blood for the purposes of accurate investigation, has in a large measure accounted for the very varied results previously obtained. Bertelsmann's method of examining the blood differs only in minor detail from that which we have been accustomed to carry out. We will refer to the actual technique of the method later, but here we may mention that it consists in the withdrawal of 10 c.cm. of blood from a vein of the patient's forearm by means of a bacteriological syringe, the overlying skin having previously been carefully disinfected. The blood withdrawn is at once divided into eight portions which are mixed with warm fluid glycerine agar and incubated at the usual temperature on Petri's plates. In using this solid media in preference to bouillon, he differs from the majority. His justification is found in the fact

that it enables any case of aerial contamination which may arise to be at once and with little difficulty detected.

The 154 cases which were examined comprised many varied infective conditions. For convenience of abstracting the results obtained, we classify them under 29 categories, which include septic foci of all degrees of severity and in a wide variety of situations.

In the 154 cases examined, 48 revealed the presence of organisms in their blood, the remaining 106 giving a negative result.

Of the 48 cases giving a positive result, 28 recovered.

We consider the cases examined under 29 varieties of local infective disease, as already said. In 10 of these not one single negative result was obtained. The types of disease that revealed organisms in the blood at every examination were — acute osteomyelitis, of which 8 cases were examined; suppurative teno-synovitis, with complications, of which there were 4 cases; puerperal sepsis, of which two cases came under his observation; cellulitis, complicated with thrombosis and endocarditis; malignant pustule; meningitis after trauma; wound of the lung after fracture of a rib; peritonitis after puerperal sepsis; peritonitis after pelvic cellulitis and peritonitis after operation, of which a single case alone was available in each instance—21 cases in all, of which 9 recovered and 12 died.

On the other hand, a uniformly negative result was obtained on examining the blood of all the patients suffering from the following conditions:—

1. Peritonitis of intestinal origin. Fourteen separate cases of this nature were examined; the peritonitis had arisen from the usual variety of causes, such as perityphilitis, perforating ulcer of the intestine, and so on. Not one revealed a single organism in the blood. Here we may mention however, a fact we shall refer to later, that not a single one recovered.
2. Venous thrombosis of the lower extremities, 9 cases.
3. Acute abscess of the neck, of glandular origin, 6 cases.
4. Mastitis, 5 cases.
5. Ischio-rectal abscess, 3 cases.
6. Chronic and sub-acute osteomyelitis, 3 cases.
7. Ruptured urethra, with extravasation of urine, 1 case.

Forty-one cases in all, of which 15 died.

Space will not admit of our giving the details of the remaining 12 diseases. Suffice it to say that urethral fever stands in a class by itself. Four of such cases were examined. Two gave a positive and two a negative result, the later result arising from the fact that in this disease the organisms disappear from the blood in twenty-four hours, destroyed by its bactericidal power.

In uncomplicated suppurative tenosynovitis and suppurative arthritis it was the rule to find bacteria in the blood.

In the remaining conditions, such as lymphangitis, lymphadenitis, whitlow, carbuncle, erysipelas, empyema, and suppurative sinus and jugular thrombosis, it was the exception.

A study of the above statistics will reveal certain points of the greatest interest and practical importance.

In acute infective diseases of bones, joints, and tendons it is the rule to find organisms present in the blood. It is the exception to find general infection present in lymphangitis and lymphadenitis, even in such cases as have led to the formation of acute abscess.

The study of the cases of peritonitis is probably of the most importance. Peritonitis of pelvic origin is proved again to be a fertile source of general infection, but one is surprised to find that of the fourteen cases of peritonitis of intestinal origin which were examined, not a single one gave a positive result, and still the patients uniformly died, a fact that is to be attributed to the reason that the blood is bactericidal, but becomes loaded with bacterial toxins which lead to a fatal issue from toxæmia. The severity of the symptoms manifested being, as Bertelsmann pointed out, due to the presence of the products, and not to the presence of the germ itself, the surgeon can with benefit do as he has frequently done with excellent result, infuse three to four litres of normal saline solution during the progress of an intestinal operation—a practice which we may mention in passing we have been in the habit of seeing carried out as a routine procedure, and one which is being more extensively adopted in recent times in abdominal surgery, Mikulicz Radecks being the most recent convert to the school of "wet surgery," the hyperleucocytosis which normal saline infusion induces being, however, the grounds of his conversion (*Deut. med. Zeitung*, 19th May 1904).

The nature of the organisms cultivated from the blood is worthy of study.

In 28 cases streptococci.
„ 13 „ staphylococcus aureus.
„ 3 „ staphylococcus albus.
„ 2 „ mixed infection.
„ 1 case pneumococci.
„ 1 „ bacillus coli communis.
„ 1 „ anthrax bacilli.

In 68 per cent. of the streptococcal infection cases recovery took place, whilst in 30 per cent. only of the staphylococcal cases was such a fortunate result obtained.

The question of the true scientific distinction between

septicæmia and pyæmia is answered well in Bertelsmann's paper. His experience of the invasion of the blood by bacteria from a local focus agrees with what other people have found in their investigations conducted on animals. Shortly after the animal is inoculated intravenously or subcutaneously with cocci, the micro-organisms are found in the blood, and then follows a stage when the blood is free from bacteria. In such cases, where recovery takes place, no reappearance of them in the blood is seen, but they remain in the inner organs for some time. In those cases where the animal's power of resistance is unable to overcome them, they multiply in the above mentioned situations, and again appear in the blood.

In many cases of osteomyelitis he saw, after the primary focus had been evacuated, the organisms which had been up till then abundant in the blood disappear promptly, and without leaving a trace of their presence. It would appear accordingly that even the most virulent infective agent finds in the blood an unfavourable nidus, and that it is in the inner organs, perhaps in the diseased endothelium, they find a favourable habitat. According to Fraenkel the bone marrow is their favourite haunt. For septicæmia to exist it would accordingly appear that it is necessary for the organisms to settle themselves in a particular locality. This, hitherto, has been reckoned as a characteristic of pyæmia. The principal difference between the two is shown thus to have disappeared, for in both cases we have the localisation of the exciting cause, from which the organisms penetrate into the blood to exist, but not to thrive there.

The ultimate *conclusions* arrived at by the observer, based on the results of his own work, are:—

1. In many apparent local infections, organisms are present in the blood. In these cases the number of bacteria which are found may often be very numerous. In fact, the number found may often exceed that found in cases of acute and pronounced general septic infection. Whether the invasion takes place or not depends as much upon the virulence of the organisms as upon the severity of the local lesion.

2. The penetration of bacteria into the blood may remain entirely without clinically recognisable result for the patient, because the bacteria which enter are quickly destroyed by the bactericidal power of the blood after the removal of the primary focus.

3. Sometimes the virulence of the germ is so great, or the power of resistance of the patient so small, that either virulent sepsis kills the patient, or the pathogenic germs settle in the body and establish themselves in various places. In the latter case this fact, however, is not absolutely

proved; the repenetration of the germs into the blood again follows.

4. A number of surgical infective diseases lead to death without bacteria being found in the blood during life, and in such cases one must conjecture that the patients die from toxæmia.

5. Despite the fact that it runs contrary to the accepted teaching, it would appear that the invasion of streptococci into the blood affords a better prognosis than when staphylococci break into it.

Finally, it may be asked what value is to be attached to the bacteriological examination of the blood as an indication to warrant amputation. At first consideration, it would appear that such an indication would be obtained with ease. A careful study of the recorded cases, however, reveals the fact that in none of Bertelsmann's cases was such obtained. In one case that required amputation, the operation was performed, and only subsequent to it were organisms found in the blood.

In other cases, amputation was performed for chronic suppurating lesions with good result to the patient, but no organisms were found in the blood before or after the operation. Thus, as an indication for amputation it should be used with care. Such a case as would warrant it being used as an indication for amputation would be where their presence is ascertained and a steady increase in their number is revealed, despite local treatment.

Technique.—The best proof of the value of Bertelsmann's technique is undoubtedly the work done by his colleague, Schott Müller, who, carrying it out in the investigation of cases of typhoid fever, obtained 84 positive results in 101 cases, a record which so far stands alone, and cannot be impeached on the grounds of aerial or dermal infection by Eberth's bacillus.

To carry out such investigations the following are necessary:—

1. A Luer's glass bacteriological syringe to contain 25 c.cm.
2. Eight Petri's plates carried in a culture basket.
3. Portable water bath with spirit lamp which is able to contain eight 10 c.cm. glycerine agar tubes.
4. A wide-mouthed jar which contains water at 40-42° C.
5. Thermometer for the above.

The preliminary preparation, prior to the withdrawal of the blood, consists of the sterilisation of the skin of patient's forearm very thoroughly, the syringe and Petri's plates having been previously sterilised in a hot air steriliser for 20 minutes at 160° C.

The glycerine agar tubes are melted in the water bath.

They are kept in it for some time to prevent their solidifying too soon and to resterilise the medium immediately before use.

The syringe, which has been sterilised in its component parts, is fitted up, care being taken not to contaminate any part of it except the outside of the barrel. The hypodermic needle is drawn through the flame of the spirit lamp; the agar tubes having been placed previously in the jar of water at 40° C. and given time to cool down to that temperature.

With the usual preparations and precautions, 10 c.cm. of blood is withdrawn from a vein of the forearm, the skin being punctured by the needle of the syringe. The blood withdrawn is divided into the eight glycerine agar tubes, and having been thoroughly mixed with it, the mixture is poured on to the eight Petri's plates, and all placed in the incubator whilst still fluid. In counting the germs which grow upon the culture media, any which grow upon that portion of it which remains in the tubes are, of course, included.

The objection to the method is, as Canon has pointed out, that it does not allow germs which have become to a certain extent devitalised to propagate, from the contiguity of the bactericidal blood, and from the anaerobic conditions under which many of the buried organisms must exist. These disadvantages are acknowledged, but are minimised by taking care that the blood is at once thoroughly mixed with the warm fluid agar.

In this connection, it is of interest to note that in those cases where the blood had coagulated prematurely, colonies of organisms were not found in the blood clot but in the neighbourhood of it only when dealing with staphylococci. On the other hand, when it is streptococci which are present, the bactericidal property of the blood appears to be slight when outside the body.

If it is wished to get rid of the objection to the bactericidal property of the blood, one may adopt Baur's process, *Centralbl. f. Chirurgie*, 1902, No. 10.

By the addition of 1 per cent. of grape sugar in the proportion of 2 to 1 to the media, he claims that this result is obtained. He keeps the mixture a day in the incubator before pouring it on to the Petri's plates.

Although it is Bertelsmann's rule to depend on the hypodermic puncture only for the withdrawal of the blood, he did a certain number of control examinations in which he exposed the vein through a skin incision.

The results in the latter cases differed in no way from those obtained by the simple skin puncture method, and prove that,

with efficient preparation dermal contamination may be excluded, and that the more simple and humane method is all that is necessary.

OBSTETRICS

By R. C. BUIST, M.D., M.R.C.P.,
Physician, Dundee Maternity Hospital

PYELONEPHRITIS AND PREGNANCY

KENDIRDJY, a pupil of Legueu, gives a full systematic discussion of this important subject in the *Gazette des Hôpitaux* (1904, Avril 9, 16, Nos. 41, 44). There are 64 cases on record, and at the close of the discussion he gives a short abstract of each, and a careful bibliography. The authors, with the exception of Pestalozza, deem it secondary to a dilatation of the ureter from the direct compression by the uterus. Pestalozza says that the autopsies he has made on women dying in pregnancy have not shown dilated ureter, but he comes back to another form of the same explanation by alleging that the expanding uterus separates the layers of the broad ligaments, especially on the right, and thus twists the ureter and produces retention of urine. If the affection is not double it is much more frequent on the right than the left. We may remark that the occurrence of dilatation of the ureter, either in pyelonephritis or in eclampsia, is not demonstrated by any statistics yet brought forward. Even the extensive series of 130 eclampsia autopsies recorded by Pollak from Vienna showed only 18 with both ureters dilated, and 17 with the right alone; so that even if the dilatation be a contributory factor when it occurs, we are left to find a different explanation for the other three-fourths of the cases. True in eclampsia, this is still more the case in puerperal pyelonephritis, since the patients usually recover. Thus, though a possible, the dilatation of the ureter remains a hypothetical explanation. Passing this we come to the mode of infection and its kind. Vinay in one case found streptococcus alone, but in most of the other cases the bacterium coli has been the organism present. This and the relative frequency of disturbances of the intestinal tract, constipation, and especially diarrhœa, as antecedents make it probable that we have to deal with a descending infection. Cystitis is often absent and may be secondary.

In 11 of the cases the symptoms arose in the early months of pregnancy, in the others it was only found in the later half. In some of the early cases there was history of former attacks sometimes associated with a previous pregnancy, not always that immediately preceding. There are apparently two clinical

forms, one acute and febrile, the other apyretic, chronic and latent; 27 of 31 cases were in primiparæ. There is no definite evidence of an age influence.

In only 6 of 62 cases was the affection confined to the left side; in 4 it was bilateral, but one of these was apparently a case of sepsis. The onset was brusque in 12 cases, and the early symptoms may be pain and frequency of micturition, as in cystitis. The main symptom is pain, sometimes with recurrent crises. The pain is usually lumbar and may radiate to the abdomen. Fever of varying intensity and duration is at times present, especially in the acute form, and digestive disturbances, which may simulate typhoid, often mark the onset. Owing to the pregnancy, palpation is not always possible. The pyuria is the characteristic sign, but there may be a superadded albuminuria, and a precedent nephritis is a predisposing cause of importance.

A large number of cases, but not all, recover spontaneously after delivery, and it may reappear in successive pregnancies. Vinay has seen it in three succeeding pregnancies, and in the case of Albarran and Wallich it appeared in the fifth month of each of two consecutive pregnancies. In the case of Bar and Luys it appeared in the thirteenth pregnancy, did not completely recover, and was aggravated in the next. In this case, which was observed by the method of urine separation, the left kidney only was affected.

The diagnosis is not usually difficult, but the method of urine separation makes it possible to tell accurately the condition of each kidney, a matter of some importance in view of the possible need of surgical interference in some cases. The puerperium may be afebrile, especially if some time have elapsed since the last febrile attack; if fever occur, it can usually be distinguished from that of puerperal infection by the variability of the temperature.

The prognosis is good as regards the mother. Only two of the cases died, one after a nephrectomy and the other where the kidney condition was probably only part of a sepsis. Of 62 cases only 21 did not go to term. In 2 abortion, and in 6 labour was induced, and 13 had spontaneous premature labour. The risks otherwise do not appear to be greater than normal for the child. Treatment should be in the first place medical; even without the interruption of pregnancy, patients may recover. If the case is not doing well, the pregnancy may be terminated. Only after this should surgical treatment be considered. With normal bladder the method of vesical distension has given good results. Nephrotomy has been done twice after delivery, and twice during pregnancy, and nephrectomy has been done thrice, in two cases during pregnancy, which was not unfavourably affected.

The article closes with a resumé of our information as to the relation of nephrotomy and nephrectomy to pregnancy. He has only found five records illustrating the relations of nephrotomy, but Cova in the *Annali di ostetricia* in 1903, collected 36 cases of nephrectomy. In 13 cases a subsequent pregnancy showed no unfavourable result on pregnancy or fœtus. In 21 done during pregnancy, the pregnancy was interrupted five times, and in these it was done at the end of the fifth month.

Interventions directed to the Pelvic Sympathetic. (*Gaz. des Hôpitaux*, March 26, 1904).—Patel and Viannay, writing from the clinique of Professor Jaboulay of Lyons, have published a most interesting, if to a certain extent speculative, paper under this title. They state that Jaboulay, who had worked out the surgery of the great sympathetic, operated in 1898 on the sympathetic ganglia and branches in the neighbourhood of the rectum in a case of pelvic neuralgia. The result, as in the section of the cervical sympathetic in cases of facial neuralgia, served to show the influence of the grey nerves on the viscera, and also on the medullated nerves. Basing, then, his reasoning on the anatomy of the pelvic sympathetic, Laboulay extended his operative treatment to cases of sciatica, arthralgias of nervous origin, painful amputation stumps, and more recently to nervous affections of the bladder, and specially to essential incontinence of urine.

The pelvic sympathetic consists of the double chain of sacral ganglia ending in the single coccygeal ganglion, and connected with the anterior branches of the sacral nerves and of the hypogastric plexus formed by branches from the sacral chains and from the aortic plexus. In distribution it sends branches to the great sciatic, to the bladder, the genital organs, including in man the seminal vesicles and the prostate, communicating with the internal pudic nerve, and in woman including the uterus, vagina and the erectile organs, and lastly, branches go to the arteries of the lower limb. The anatomy of the arterial distribution is not yet fully demonstrated.

The cases to be treated through the sympathetic are thus affections of the pelvic viscera and affections of the lower limbs. In the female genital organs we have especially vaginismus and some cases of pelvic neuralgia, that syndrome of ill-defined pains where no physical signs of disease can be found, and we have further certain disturbances of menstruation. In the male the genital symptoms are not so easy to separate from the urinary, but certain cases of frequent micturition, irregular and erratic erections, and certain cases of prostatorrhœa and spermatorrhœa have, by the success of the treatment, proved their

dependence on the sympathetic mechanism. Of symptoms exclusively urinary, the essential incontinence of urine is the most amenable form.

In affections of the lower limbs, apart from certain persistent sciaticas, painful amputation stumps and perforating ulcers, the pain of some cases of tabes has been subdued through the sympathetic, and certain arthralgias, especially the form described by Brodie, with severe periarticular pain, capricious and out of proportion to any physical signs, and associated with severe muscular spasms.

The possible methods are passed in review, and those giving indirect action on the sympathetic, including the method of epidural injection, are successively rejected. Of the more direct methods, the first was operative separation of the rectum, but for the last two years Jaboulay has used retro-rectal injections, and latterly injections of artificial serum only. The technique is as follows: the patient lies on one side, and the upper thigh is drawn up against the abdomen. The operator's finger is placed in the rectum, pulp up. The needle is inserted midway between coccyx and anus. After it is through skin and cellular tissue the heel has to be sharply lowered to clear the tip of the coccyx, then under the guidance of the finger it is pushed almost directly up for about two inches. The saline solution is then injected, the quantity being about 250 c.c. in the male, and from 300 to 400 c.c. in the female.

Of the results obtained, cases have been reported in detail by Jaboulay and his pupils. See Jaboulay, "Le vaginisme chez l'homme, chirurgie des centres nerveux, des viscères et des membres"; and Termier's *Thèse de Lyon*, 1899-1900, "Contribution à l'étude de la chirurgie du sympathique dans les névralgies et syndromes douloureux." A short resumé is given in the paper.

Pelvic Neuralgias.—Separation of the rectum was practised three times, these being the first cases treated. In one the vaginismus ceased completely, and in the others temporarily, and the radiating pains were much ameliorated. In two cases retrorectal injections were made. One case had concomitant urinary trouble, and had been treated for cystitis; she completely recovered. The second case was a neuropath who had had hysteropexy, and perineorrhaphy for incipient prolapse, but her pains had reappeared with vesical trouble. After the injection she was better, but it was too early to say if the cure were definite.

Sciatica.—Five cases were treated by separation of the rectum, four with complete success and one with marked improvement, whereas all medical treatment had failed com-

pletely. One case treated by injection has been well now a year.

Trophic Conditions in the Lower Limbs.—The results depend on how far the lesion is dependent on actual neuritis. A perforating ulcer in a tabetic recovered after simple injections, and a painful stump with ulceration was freed from pain by one injection, and the ulcer was reported healing.

Urinary Conditions.—Injection has given good results in several cases in women and, in the only man treated improvement began after the third injection. In organic affections, such as renal tuberculosis, the pain may be exaggerated instead of improved.

Essential Incontinence of Urine.—Three women of twenty years have been treated by injection with complete success so far, and three young children have been successfully injected for enuresis.

PATHOLOGY

By T. SHENNAN, M.D., F.R.C.S.

Pathologist, Royal Infirmary, Edinburgh

Pneumococcus-Peritonitis (Dr Anton Ghon, *Wiener klin. Wochensch.*, No. 10, 1904).—The writer details four cases of peritonitis of this nature and refers to other similar cases reported by Barbacci and Jensen, the former of whom demonstrated the pneumococcus by inoculation in 8 out of 13 cases. Two of these followed perforation of gastric ulcers. A correct diagnosis was reached more readily by inoculation of mice and rabbits than by cultivation on artificial media, on which other bacteria, *e.g.* bacillus coli communis, tended to outgrow and overwhelm the pneumococcus.

In Ghon's first case, that of a maid-servant of 23, the peritonitis followed perforation of a gastric ulcer. The peritoneal pus and exudation contained exclusively the diplococcus lanceolatus.

In the second case, a female, æt. 59, who died from carcinoma of the stomach with perforation — the peritoneal exudate contained pneumococci and a large bacillus. The stomach contents showed, under the microscope, numerous large bacilli, a few pneumococci, and yeast cells. On culture these bacilli and others of the coli group alone developed. The large bacilli were found plentifully in the necrotic part of the tumour. It looked as if pneumococci had multiplied both relatively and absolutely in the peritoneal exudate. The large bacilli were most probably saprophytic.

In the third case, a male, æt. 61, who died from peritonitis following eight days after gastroenterostomy, there coexisted lobular pneumonia in both lungs, with purulent bronchitis. Numerous lanceolate diplococci and Gram-negative bacilli were seen in the peritoneal exudate. Coliform organisms alone developed on culture. Inoculated mice died, after twenty-four hours, of pneumococcus septicæmia. The pneumonic exudate and the bronchial pus contained numerous pneumococci with other bacteria. They were also found on the mucous membrane and in the wall of the stomach near the wound. The pneumococci causing the peritonitis had evidently been derived from the lungs.

In the fourth case, female, æt. 55 years, there was an ulcerating carcinoma of the stomach, with peritonitis. The patient died of pneumococcal meningitis. The glands near the greater curvature were enlarged and contained large numbers of pneumococci. These gave a pure culture on artificial media. The gastric veins near the tumour contained thrombi packed with pneumococci. The peritoneal exudate contained numerous pneumococci and a few bacilli of the "coli" group. Ghon is convinced that the peritonitis originated from the affected lymph glands, rather than directly from the stomach; the meningitis being the result of metastasis from the thrombosed gastric veins.

He considers it doubtful whether many of the organisms found in peritonitis, whose pathogenicity for man is not proved, have anything actually to do with the disease, but are not really saprophytes developing on the exudation produced by the primary bacterium, in these cases almost certainly the pneumococcus.

The pneumococci had evidently in three cases, at any rate, come from the upper parts of the respiratory and alimentary tracts, and Ghon's main contention is that such evidence establishes the necessity for rendering the mouth and naso-pharynx as aseptic as possible, particularly in surgical cases. The importance of careful nasal cleansing in cranial injuries has already been emphasised by A. Fraenkel.

Splenic Anæmia (Dock and Warthin, *Am. Journ. of Med. Sciences*, Jan. 1904).—These authors report fully two cases of splenic anæmia, one early and the other late, and as the clinical and pathological picture of this disease is still somewhat undetermined, such papers are of use in assisting to define it.

In the first case, a male, æt. 41 years, swelling of the abdomen had been noticed for a year; pain and resistance in the left hypochondrium for a week before admission. No intestinal hæmor-

rhage had occurred. Syphilis could be absolutely excluded. The spleen could be readily palpated. A differential blood-count showed small lymphocytes, 32 per cent.; large lymphocytes, 5 per cent.; large mononuclears and transitionals, 6 per cent.; polymorphs, 52 per cent.; eosinophiles, 4 per cent.; normoblasts, 4 to 100 leucocytes. No megaloblasts or myelocytes. Colour index not stated. The leucocytes rose rapidly to 21,000, the lymphocytes relatively being diminished, the polymorphs increasing to 90 per cent. He died on the fourth day after splenectomy.

Post-mortem.—The liver as a whole presented the characters of chronic venous hyperæmia with increase of connective tissue, intra- and peri-lobular, sufficiently marked to warrant a diagnosis of cirrhosis in an early stage. The spleen weighed 1536 grammes (49½ oz.), showed perisplenitis, and on section great fibrous hyperplasia. Microscopically the newly formed fibrous tissue enclosed large blood spaces, lined and in many cases partly filled by large endothelial cells, having one or more lightly staining nuclei. The blood-vessels were all thickened. There was a very small amount of blood pigment in the organ.

A very important change was found in the portal vein. Just at the junction of the splenic and superior mesenteric veins there was thickening, with calcification and stenosis, evidently the result of old phlebitis and thrombosis. There were numerous newly formed nodules of lymphoid tissue in the mesentery and hæmolymph nodes in the retroperitoneal fat, these formations being evidently compensatory for loss of the splenic function. The red marrow was of lymphoid type.

The condition of the spleen in this case was very evidently not secondary to that of the liver, the splenic changes being older. For these, however, the condition of the portal vein might probably be regarded as an etiological factor. There was gastro-intestinal catarrh, to which no importance was attached.

In the second case, a female, æt. 50 years, the abdomen had gradually increased in size after an attack of dysentery, which occurred six years previous to admission. Ascites was marked. Death was due to hæmorrhage from erosion of a gastric varix.

Blood examination.—Red blood corpuscles, 2,800,000; leucocytes, 5857; Hb. 60 per cent.; small lymphocytes, 6 per cent.; large lymphocytes, 5.9 per cent.; large mononuclears and transitionals, 4.2 per cent.; polymorphs, 81.7 per cent; eosinophiles, 1.2 per cent.; normoblasts, 3 per mille.; slight poikilocytosis. After laparotomy for removal of fibroids, leucocytes increased to 17,200; Hb. 40 per cent. There was intestinal hæmorhage.

Post-mortem.—The liver was the seat of atrophic cirrhosis. The spleen weighed 944 grams (30 oz.), and was very firm and

tough. Microscopically there was diffuse general fibrous hyperplasia, with hyaline change of the new tissue as a marked feature; sinuses in some cases enlarged, lined by large endothelial cells showing no great proliferation and no phagocytosis. There was no blood pigment; the lymphoid tissue was atrophied and the arteries hyaline.

The portal vein was thickened, stenosed, and calcareous just above the junction of the spleen with the superior mesenteric veins.

There were numerous newly formed hæmolymph nodes, the sinuses of which contained numerous phagocytes, with engulfed red corpuscles in varying stages of disintegration. No blood pigment was found except in these nodes and in the bone marrow.

In this case also the splenic condition was evidently older than that in the liver.

It was difficult to tell what relationship the splenic condition had to the stenosis of the portal vein in these cases. After all the spleens showed no change which might not be accounted for by a severe and long-continued passive hyperæmia. The authors considered that this condition might be due to the portal stenosis.

For the portal phlebitis and thrombosis they advance no explanation, except possibly that they resulted from a general toxæmia. Certainly the histories, "irregularity of bowels," "rectal 'polyps and ulcers,'" in one case, and dysentery in the other, would tend to support the theory of a portal toxæmia, but the writers do not lay any stress on the condition of the alimentary tract.

The liver was not examined with a view to proving a possible relationship between the old portal thrombosis and the hepatic cirrhosis.

No evidence of hæmolysis was found in the spleens or elsewhere than in the hæmolymph nodes. The authors consider that the "splenic function" was lost, and do not give any feasible explanation of the anæmia. If, as they suppose, the splenic function is lost, the reason for splenectomy in such cases is not very evident.

Tuberculosis.—There is a great mass of new literature on this subject, some of which has been summarised by Székely (Budapest) in the *Centralb. f. Bact. Paras. u. Infectionskrankh.*, Bd. xxxiv., Dec. 1903.

Székely concludes that experiments have shown that tuberculosis of human origin is transmissible to cattle. The explana-

tion of failure or success in such experiments appears to be in great measure due to the widely varying virulence of different strains of human tubercle bacilli. Other failures are due to loss of virulence by laboratory stock cultures.

As a general rule the bovine bacillus is more virulent than the human bacillus, but strains of human bacilli have been found as virulent for cattle as most bovine strains, whilst some bovine strains have been separated and found to be quite harmless for cattle.

Further, Székely is of opinion that, on the ground of material so far to hand, the question of the identity or difference of human and bovine tuberculosis cannot be settled, but the assertion that bovine tuberculosis is not dangerous to man cannot, nowadays, be maintained.

It may be noted that the Interim Report of the British Commission on Tuberculosis, June 1904, supports the view that human tuberculosis is transmissible to cattle.

Baumgarten—quoted by Székely—thinks that many of the experiments carried out on cattle with human material, which have attained positive results, are not admissible. He recommends hypodermic inoculation as the only means of determining whether the bacilli can develop and spread in the body. He refers to the known fact that dead bacilli or acid-fast pseudo-tubercle bacilli, if inoculated intravenously or intraperitoneally, may produce changes simulating true tuberculosis.

Discussing this aspect of the subject in the Berlin Medical Society, Schütz attempted to cut the ground from below his opponents by saying, "I consider Koch's standpoint to be correct, that human tuberculosis cannot be conveyed to cattle, because Koch, in my opinion, did not refer to the experimental but to the spontaneous infection of cattle with human tuberculosis.

Nature of Bacilli separated from cases in man.—Theobald Smith discusses this point further in the *Amer. Journ. of the Med. Sciences*, Aug. 1904. He contends that bovine and human bacilli are of different races or varieties. He separated the bacilli from three cases which, clinically, were undoubtedly of abdominal origin, showing marked tabes mesenterica without intestinal lesion, and in which a primary thoracic focus could be absolutely excluded.

Rich crops of bacilli were obtained conforming to the human type.

Inoculation experiments showed that they were highly attenuated. Smith tested these strains by a new method, which he described in the *Transactions of the Assoc. of Amer. Physicians*,

1903. He finds that there is a difference in the movement of the reaction of standardised glycerine bouillon in which bovine and human bacilli are multiplying. In bovine cultures this movement leads to a final reaction, either neutral, feebly alkaline, or feebly acid, towards phenolphthalein; in the case of human bacilli to a final pronounced acidity towards phenolphthalein.

It may be noted that, in two at least of the cases he describes, the bacteriological examination was not commenced until two days or more after death.

If Smith's observations are confirmed, they would go to show that tuberculosis, presumably primarily abdominal and ingestive, is not necessarily of bovine origin.

Ravenel (*Montreal Medical Journal*, June 1904) has obtained contrary results, having separated the bovine bacillus from the mesenteric glands in four cases of tabes. De Schweinitz obtained similar results in two cases, Theobald Smith in one case; Febiger and Jensen in three cases, Westenhöffer in one case; whilst the German Tuberculosis Commission had to admit that, out of sixteen children examined, four proved to have been infected by the bovine tubercle bacillus.

Ravenel holds that, while the chief source of infection in children, as well as in adults, is the human tubercle bacillus entering by the respiratory tract, it has, nevertheless, been proved conclusively that the bovine bacillus is responsible for a considerable number of the deaths from tuberculosis in children, and moreover that the number of children infected from bovine sources is quite large.

Heller (*Berl. klin. Woch.*, No. 20, 1904) discusses the results of *post-mortem* examinations of cases in Kiel. He finds a large percentage of cases of primary intestinal-gland-tuberculosis, and suggests that the negative results of some observers may be due to the post-mortems having been made either carelessly, or by men to whom the Biblical sentence might be applied, "They have eyes, but they see not."

Heller's pupils found 21 to 25 per cent. of primary intestinal-gland-tuberculosis. He compares this result with those of Orth, who found only 0.98 per cent. of intestinal tuberculosis in Berlin, discussing the question with considerable acerbity. In the end he concludes that the difference in the incidence of intestinal tuberculosis in Kiel and Berlin may be dependent on the treatment of the milk before use. As was contended in these columns three years ago, the boiling of milk before use, which is so much more common in Germany than in Britain, must have a great influence in lessening the danger from tuberculous milk in that country, even though, according to Beck, a single

boiling may not kill all the bacilli contained. Heller finds a similar difference in practice between Kiel and Berlin. While in Berlin practically all the milk is pasteurised, in Kiel and Schleswig-Holstein generally it is used raw. He looks on this as a huge experiment, from which the only conclusion to be drawn is that the larger percentage of cases of abdominal tuberculosis in children and adolescents in Kiel is directly due to the ingestion of raw milk from tuberculous cows.

Statistics are chiefly noteworthy for the amount of criticism to which they are open, and few arguments can be based upon them. Local conditions—hygienic and the rest—are not taken into account, and figures applicable to one country, or district, or city, or hospital, are taken as applicable to countries or districts, rural or urban, where the conditions of life are widely different. Further, a careful revisal of my own facts and figures (*Edin. Hosp. Reports*, 1900) has led to the conclusion, that in a varying percentage—at least 25 to 30 per cent.—of cases examined post-mortem, a positive diagnosis of the primary channel of infection is practically impossible, or, otherwise, one cannot put down a certain percentage of the whole as of respiratory origin and the remainder as of alimentary origin. There are many doubtful cases. Several statistical papers have appeared during the present year. One point only may be referred to as showing how the post-mortem findings vary in different parts of the world. Hunter, in Hong-Kong (*Brit. Med. Journ.*, 14th May 1904) found the mesenteric glands tuberculous in only 5 out of 5000 cases of tuberculosis. Out of 307 cases of tuberculosis examined in the Royal Hospital for Sick Children, Edinburgh, the mesenteric glands were affected in 137, or 44·5 per cent.

Some interesting work has been done of late to prove that tubercle bacilli can penetrate the healthy intestinal walls without causing any local lesion.

Nicolas and Descos on feeding dogs with fat soup containing numerous bacilli could demonstrate them in the thoracic duct after three hours. Macfadyen and MacConkey examined the mesenteric glands of twenty children under five years of age who did not die of tuberculosis and showed no sort of intestinal lesion. In five of these they found virulent tubercle bacilli. Hamilton and M'Lauchlan Young, Cipollina, Weleminsky, and others produce similar evidence from experiments. This fact being established, it is not difficult to imagine cases of pulmonary tuberculosis originated by bacilli passing in this way from the alimentary tract through the thoracic duct to the blood stream in which the lungs are the first organs likely to be attacked.

Method of demonstrating Tubercle Bacilli in Urine (Trevithick, *Brit. Med. Journ.*, 1, 1904).—The lower part of the urine which has been resting in a conical glass is pipetted off and centrifugalised. The deposit left in the glass is then shaken up with distilled water, again centrifugalised, and the process repeated. From the final deposit films are made and stained in the usual way. By this method the demonstration of tubercle bacilli is rendered easier. The washing with distilled water is supposed to remove the urinary salts which prevent the bacilli and even the pus cells from adhering to the slide or cover-slip.

OPHTHALMOLOGY

By ANGUS M'GILLIVRAY, C.M., M.D., F.R.S.E.,
Lecturer on Ophthalmology, St Andrews University; Ophthalmic Surgeon, Dundee Royal Infirmary; Surgeon, Dundee Eye Institution, etc.

QUININE AMAUROSIS WITH NOTES OF A CASE

CASES of quinine amaurosis are by no means common, there being only about one hundred cases on record. The following case may be of interest:—

A Ceylon tea-planter, æt. 54, consulted me on September 28, 1904, on account of the effects of quinine blindness, which he acquired some four years ago. The history he gave was as follows:—Being very much run down in health he left his tea-plantation, which is situated about 4300 feet above sea level, and went to the seaside for a week's rest, and stayed in a hotel in one of the suburbs of Colombo. He travelled all night by the mail train, and arrived at his hotel shortly before eight o'clock in the morning almost in a collapsed condition, having had no sleep all night. The hotel manager, seeing him on arrival, informed him that he was suffering from fever, and gave him what he called "an up-country dose" of quinine, namely a heaped-up dessert-spoonful, and got him away to bed. He fell soundly asleep, and on awaking at two o'clock in the afternoon, he found to his astonishment that he was stone blind. The boy in attendance being called, he was informed it was not midnight, as he supposed, but two o'clock in the afternoon. An electric lamp hanging from the roof above his bed was switched on, but he failed to see even a trace of light, although his eyes were directed straight towards it. He lay in bed for two days stone blind, but on the third day could distinguish day from night, and no more. On the fourth day he got out of bed for a short time, and walked about

his room, but was able only with the greatest difficulty to avoid obstacles, although it was the brightest time of the day. On the sixth day he drove to Colombo to see a doctor, and remembers remarking to the driver how curious everything looked. The sea on one side appeared black as if looking on a large sheet of water at the dead of night, and the grass on the racecourse on the other side of the road had the appearance as if one were looking through a dark green eclipse glass. The doctor, whom he saw, prescribed a mixture, and informed him his recovery would be a protracted one. On the following day, seeing a little better, he went up-country to his plantation, but on his arrival he was unable to make out the individual tea bushes for they looked all in one, although they are the size of a large gooseberry bush, and planted four feet by four apart. He was also unable, while walking along the footpath, to distinguish between the "flush" and the bud, *i.e.* between the two opened out lower leaves of the bud and the bud proper. Under ordinary circumstances he could readily recognise the flush from the bud at a short distance away. It was then he discovered that the periphery of his fields of vision were more defective than the central part. On the eighth day a gradual improvement in vision set in, especially in the central part of the field, for he was able, with the help of strong spectacles, to read a letter, although with difficulty. Everything appeared as if he were looking through two scrolls of music, *i.e.* objects to the sides, above and below were dark. He wore deep neutral-tinted glasses to protect his eyes from the strong glare of the sun. On being questioned regarding his light sense he was certain he saw better in sunlight than in twilight, the opposite of what one finds in tobacco and alcohol amblyopia. The vision continued to improve gradually, but he never regained his complete peripheral vision, and at the present time, although his central vision is good, he is liable to stumble over anything in a room unless his eyes are directed straight to the object, and while walking along the street he knocks up against people, not seeing them as they come alongside. It is chiefly on this account that he consulted me. He has never smoked, but has been a very heavy drinker, taking often a bottle of whisky a day. There is a specific history, some fifteen years ago, but so far he has experienced no bad after-effects. He is a tall, handsome, well-built man, and a typical looking Anglo-Indian, having spent thirty years in Ceylon. His vision with each eye is six-fifths partly, and he reads *Jaeger No. 1* fluently with + 3D spherical right or left, *i.e.* with the ordinary correcting glasses for his presbyopia. The pupils are three millimetres in diameter, and act sluggishly to light and accommodation. The media

are normal, but the optic discs look uniformly atrophic, and the retinal vessels are slightly smaller than normal. His fields of vision, taken with the perimeter, are narrowed, especially above and below, but not directly towards the nasal and temporal sides, thus presenting a narrow elliptical shape running transversely. His colour and light sense are practically normal, and there is no central scotoma for colours. With regard to his hearing being affected at the time of his blindness, he is not aware of any disturbance, and so the amaurosis might be regarded as one of acute alcoholic origin, but for the other symptoms, all of which point clearly to its being of quinine origin.

In practically all the cases recorded, the drug has found its way into the system through the stomach, and it is interesting to note that all the alkaloids in the cinchona bark may cause blindness, as has been experimentally shown by De Schweinitz on animals. It is stated that even very large doses of the tincture of the bark may cause it, but, as might be expected, the salts of quinine produce visual disturbances most readily.

That quinine itself and not a concomitant disease is the cause of the amaurosis can be proved by the cases recorded in which the drug was taken inadvertently by healthy persons, and by the numerous experiments that have been conducted on animals.

With regard to the toxic dose, it varies in man from fifteen grains to an ounce a day. Cases are recorded in which a much smaller dose has affected vision, but in almost all such cases there was a strong idiosyncrasy and a marked neurotic temperament existing. So far as we know there is no racial immunity, but it appears from the recorded cases that the affection is much more prevalent among men than women. As regards the age, it varies from three to seventy-three, according to De Schweinitz, thus differing from tobacco amblyopia, which is found most frequently about middle life and upwards, but never so early as three years of age.

Quinine blindness is met with either in mild or in severe form, and is invariably bilateral. In *mild cases*, the defect in vision is said to be limited to temporary amblyopia, *i.e.* diminution in vision, without ophthalmoscopic changes or accommodative impairment. But in *severe cases* the blindness is invariably complete—*amaurosis*—or incomplete, and is ushered in with great suddenness as in the case just recorded. The intensity of the blindness is more marked than in any other recoverable form of toxic amblyopia, and the blindness is accompanied by extreme pallor of the optic discs and ischæmia of the retina from contraction of the retinal blood-vessels through spasm, together

with contraction of the fields of vision. Besides these symptoms, which are the most prominent, we find diminution of the colour and light sense, dilatation and immobility of the pupils during the acute stage, diminished accommodation, proptosis, nystagmus, and occasionally divergent strabismus. Other symptoms are met with, such as increased tension, retinal haze, and a cherry red spot in the region of the macula, but these are very seldom seen.

The progress of the disease is as follows:—The central vision is gradually restored, either completely or partially, within a day or two, or it may take months or years, and the colour sense, which to begin with is affected, slowly improves, but not infrequently it remains permanently impaired. The same applies to the light sense. The fields of vision gradually widen out, but seldom regain their normal limits. Permanent blindness is rarely met with, so that, on the whole, the prognosis is good. The optic discs may remain pale and atrophic looking for years after the attack, but in some instances they may regain their normal colour.

Relapses of blindness are met with, especially if recourse be had to the drug, even in small doses, during the period of convalescence. The deafness, which usually accompanies the amaurosis, very soon passes away, usually in twenty-four hours.

Pathology.—The lesion is undoubtedly a peripheral one. According to De Schweinitz it seems to be as follows:—"In the earlier stages of the blindness, *i.e.* from the first to the fourth week (*ophthalmoscopically* pallor of discs and great contraction of vessels), the microscope reveals in the optic nerves imperfect differentiation of the fibrous trabeculæ and a spreading apart of the individual nerve fibrils, which are beaded and varicose, and beginning to be atrophic. At this time no marked changes are present in the vessels. There is no evidence of neuritis. Later, *i.e.* from two to three months after the onset of the blindness (*ophthalmoscopically* white discs and practically complete obliteration of vessels), there is nearly complete atrophy of the optic nerve fibres, thickening and collapse of the nutrient arteries of the optic nerve, increase in size of the perivascular lymph spaces, and occasionally (two cases) partial obliteration of the central vessels of the nerve with a partly organised thrombus. The atrophy extends throughout the nerve, chiasm and tracts. Even in sections of the nerves, which ophthalmoscopically give every evidence of atrophy, and which under the microscope show extensive atrophic changes, certain fibrils still remain unaffected, and, singly or in patches, stain somewhat imperfectly with the Weigert and Weigert-Pal reagents. This probably explains why vision is sometimes retained, even when the degenerative process appears complete. It is analogous

to the retention of unaffected nerve fibres within the atrophic areas of the papillo-macular bundle in cases of alcohol and tobacco amblyopia."

Subsequently Ward A. Holden conducted an elaborate series of experiments on dogs, employing the newer histological methods. He states that, with the lessened but not obliterated blood supply due to spasm of the retinal vessels, the less resistant elements of the inner layers—the ganglion cells and the nerve fibres—break down, while the cells of the inner nuclear layer are not visibly affected, and ascending degeneration of the nerve fibres follows the retinal changes. De Bono on the other hand has arrived at entirely different conclusions regarding the pathogenesis of quinine amaurosis. According to this observer the eyes of animals poisoned with quinine manifest changes only in the choroidal and central vessels, but not in the retina and optic nerve, and he is of the opinion that the ischæmia is not the sole cause of the functional derangements, for the reason that they may disappear while the ischæmia remains. He believes that there is direct intoxication of the protoplasmic elements of the retina, which in turn exerts an injurious effect on the layer of rods and cones.

De Schweinitz, commenting on De Bono's conclusions, finds it difficult to understand how De Bono has failed to observe the atrophy which can always be produced in the optic nerve by quinine, except on the supposition that on the animals experimented on, the examination was conducted before the period of atrophy sets in.

At the present time the only moot point in the pathology of this affection is the cause of the primary contraction of the retinal vessels which causes the marked anæmia of the fundus as seen with the ophthalmoscope. Whether the cinchonised blood, passing through the vessels of the fundus, exerts a direct and powerful vaso-motor action on the vessel wall, or whether the cause be a remote one, we at present do not know. With the newer pharmacological methods there seems to be no reason why this point should not be cleared up in the near future.

With regard to treatment, during the acute stage of the disease, good results have been got from the inhalations of nitrite of amyl, and the internal administration of digitalis. Strychnine is undoubtedly of service, if we are to judge by the recorded cases so treated, and galvanism has found an advocate in Buller. The present case is being treated by large doses of strychnine internally in the hopes that the contracted parts of the fields of vision may widen out, but judging by the pallor of the optic discs and the duration of the affection, the prognosis does not seem hopeful.

Editorial Notes and News

Glasgow and Aberdeen Universities.

WHEN it was announced last May that Sir Henry Craik had agreed to accept nomination as member for these universities in succession to the Right Hon. J. A. Campbell, most people probably thought the election was as good as over. But the Glasgow University Conservative and Liberal Unionist Association and the Aberdeen University Unionist Association reckoned without the Universities of Glasgow and Aberdeen Conservative and Liberal Unionist Association. This latter body has nominated Dr W. R. Smith, of King's College, London, as its candidate. We have, of course, no concern with the differences between two so similarly named Associations, but we think the majority of the medical electors resident in Scotland were quite prepared to acquiesce in the election of so prominent an educational authority as Sir Henry Craik, in spite of the fact that his present tenure of an official post prevents him making public his views on current topics. Just as we go to press a rumour reaches us that the Liberals hope to induce Sir Frederick Treves to contest the seat.

Glasgow Northern Medical Society.

THE following are the office-bearers of the Society in the session 1904-5 :—President, Dr Galbraith Connal; Vice-Presidents, Dr John G. Gray, Dr John Ritchie; Treasurer, Dr Todd; Secretary, Dr Malcolm Campbell; Reporting Secretary, Dr Scott Frew; Seal-keeper, Dr Baird; Auditors, Dr Dinwoodie, Dr Spinks; Members of Council, Dr James B. Miller, Dr Malcolm Black, Dr R. G. Inglis, Dr C. S. Marshall, Dr J. Steele Muir, Dr John Donald, Dr J. A. C. Macewen, Dr P. Macbryde, Dr Ballantyne, Dr Jas. N. Allan, Dr Edmiston, Dr A. T. Campbell.

Royal College of Physicians of Edinburgh, Royal College of Surgeons of Edinburgh, and Faculty of Physicians and Surgeons of Glasgow.

THE following gentlemen having passed the requisite examinations of the Conjoint Board were admitted diplomates in Public Health :—James Allison, M.B., C.M., Cambuslang; Kershaw Dinshah Khambatta, L.M. and S., L.R.C.P. and S.E., Edinburgh; Alfred Robert Maclurkin, M.B., Ch.B., Glasgow; Daniel Mackinnon, M.B., Ch.B., Edinburgh; Richard Staward, F.R.C.S.E., Glasgow: Alexander Mouat, M.B., Ch.B., Leith;

Lambert Kenneth Rodriguez, L.R.C.P. and S.E., Edinburgh; Herbert Francis Lechmere Taylor, M.B., C.M., Edinburgh; Herbert De Carle Woodcock, M.R.C.S. Eng., L.R.C.P. Lond., Leeds; and David Dryburgh Gold, M.B., C.M., Markinch.

At the same sederunt Messrs James Alexander Raeburn, M.B., Ch.B., Edinburgh, and Mowbray Taylor, M.B., C.M., Kent, passed the first examination in Public Health; and Mr Robert Dodds Brown, M.B., Ch.B., Edinburgh, passed the second examination in Public Health.

New Books and New Editions

The Nervous Affections of the Heart. Being the Morison Lectures delivered before the Royal College of Physicians of Edinburgh in 1902 and 1903. By GEORGE ALEXANDER GIBSON, M.D., D.Sc., F.R.C.P. Edin., F.R.S.E., etc. Pp. 99. Edinburgh and London: Young J. Pentland. 1904.

THESE lectures having been before the medical world on two previous occasions, once as delivered, and again in the pages of the *Edinburgh Medical Journal*, it is natural to ask ourselves if their production in their present book form is justified, and the question may be at once answered in the affirmative.

The lectures were six in all, an equal number being devoted to sensory and motor affections of the organ.

Of the former, the anthor takes angina as the type, and a good historical and clinical picture is presented.

It is probable, however, in spite of the disclaimer on p. 20, that a short space devoted to diagnosis would have increased the value of the treatise. All pains in the cardiac region are not angina, and some description, which Dr Gibson could have given so well, of the differences between this disease and such painful affections as intrathoracic growth, peritonitis, aneurism (especially the pains of aneurism rupturing into the pericardium or mediastinum), diaphragmatic and pleuro-pericardial pleurisy, and hepatic and renal colic, would have added to the clinical value of the book, while, when the question of treatment comes to be considered, such diagnosis is of course essential.

Stress is laid on the importance of the connection between disturbances of viscera and cutaneous pain and hyperæsthesia, and the innervation of the heart is well described, though some of the figures, *e.g.* fig. 17, are perhaps a trifle speculative.

Here, as later, the author seems to range himself with the

supporters of the neurogenic theory of cardiac action, and, while quoting some of their works, to give too little weight to the arguments of such exponents of the myogenic theory as Engelmann, Wenkebach, etc. The analogy between the pain of angina and that of contraction of unstriped muscle in colic and uterine cramp, and of striped muscle in cramp of the somatic muscles, is not sufficiently considered.

While due tribute is paid to the work of Ross, Head and Mackenzie on the cutaneous representation of visceral nerves, Dr Gibson, perhaps accidentally, conveys the impression that he considers that most of the pain in angina is cutaneous and reflected, while surely, at any rate in the most severe cases, the greater part of the pain is referred directly to the affected organ as in the other forms of cramp mentioned above.

Here, as again later, in the consideration of rhythmic irregularities, some reference to the phenomenon of "heart block" would have been welcome.

On treatment, as we should expect, Dr Gibson is excellent. He gives the foremost place among drugs to nitroglycerine, but it is pleasant to notice his plea for colchicum, and his remarks on its dosage (note, p. 50).

The three lectures on motor affections are headed respectively: Rate, Rhythm, and Force.

In the absence of any really accurate means of determining the force of any given beat of the heart, the first two of the above divisions claim the most attention. It may be noted, however, that Dr Gibson considers palpitation to be due to increase in force of the heart beat.

Alteration of the rhythm of the heart in its numerous varieties is always a fascinating theme, and a good account is given of bradycardia, tachycardia, and allorhythmia, with remarks on the investigations of Wenkebach, Cushing and Mackenzie on artificial experimental interferences with the regular cardiac rhythm.

Here, also, while fully acknowledging the important part played by toxic agencies in the production of pathological alterations of heart rate and rhythm, Dr Gibson appears to consider that the influence of such agencies is rather through the nerves than directly upon the muscle cells. We fancy that not all authorities will agree with him.

In conclusion, lest too much should seem to have been made of points where legitimate differences of opinion may exist, unreserved tribute must be paid to the learning and evidence of research exhibited throughout the lectures, and these, joined to an easy and cultured style, make them very pleasant reading.

The book is a mine of information, but, owing to the absence

of an index, liker to a diamond mine, where prizes may be found scattered at irregular intervals, than to a gold one, where a solid stratum of ore can be reached with ease and certainty by the worker.

Serums, Vaccines and Toxines, in Treatment and Diagnosis. By WILLIAM CECIL BOSANQUET, M.A., M.D. Oxon.; F.R.C.P. Lond. Pp. 344. London, Paris, New York and Melbourne: Cassell & Company, Limited. 1904. Price 7s. 6d.

IT is not easy for the general practitioner, whose time for reading is necessarily limited, to keep abreast of the enormous amount of literature which has recently appeared on the subject of immunity and other allied questions. And yet a subject which is so intimately connected with modern therapeutics cannot fail to be of great interest and practical value to him. In Dr Bosanquet's very attractive volume he will find a most clear account of the latest views on immunity, and an admirable summary of the methods of the preparation of the various serums and vaccines, and their practical application in therapeutics. It is no exaggeration to say that Dr Bosanquet's book is as easy to read as a novel. It opens with chapters on immunity, gives some account of hæmolysis and the phenomena of agglutination, and explains the preparation of toxines and antitoxines. Thereafter the practical use of the serum preparations is considered, a chapter being devoted to each disease. That on diphtheria is naturally of great interest, the results of serum treatment in that infection being much more satisfactory than in the other diseases. Statistical tables are given, showing the results of the use of diphtheria antitoxine, and this, we may add, is done freely throughout the book. Another good point is that at the end of each chapter Dr Bosanquet gives his conclusions as to the value of the serums or vaccines discussed. A practitioner wishing to know whether to use a particular serum could, by reading these conclusions, come to a decision in a few minutes. As regards tetanus, Dr Bosanquet thinks that the serum can do no harm and should be always given, but it cannot be expected to cure any large proportion of cases in whom the disease has developed. Intra-cerebral injection appears to offer the best chance of neutralising the poison already absorbed. Prophylactic injections are valuable, in countries where the disease is common, in all cases of crushed wounds, where dirt may have got into the wound. There is an interesting chapter on snake bite and antivenene, and Calmette's

serum is highly recommended, though it apparently is only effectual against cobra poison. Vaccination for small-pox is adequately discussed, as is also the treatment and diagnosis of tubercular diseases by tuberculin, and both these chapters are of great practical value. We are pleased to note that Dr Bosanquet doubts whether scarlatina can be attributed to infection by a streptococcus. He holds that the tissues in scarlatina offer a favourable pabulum for that germ, and in the meantime that appears to be the safest view to take. As regards the streptococcal diseases generally he advocates the use of only freshly prepared serum. The serum on the market is an anti-bacterial preparation, and all such serums lose their powers quickly. Failure to obtain results may sometimes be attributed to this cause, although it must be admitted that the results obtained by antistreptococcal serum have on the whole been disappointing. Dr Bosanquet barely mentions its use in erysipelas, which in our own experience has been very disappointing indeed. Amongst the more recent preparations considered are Chantemesse's typhoid antitoxine, and the antityphoid extract of Jez. We have had some experience of the latter, and, so far as we could decide, found it absolutely useless, although we agree with the author that theoretically it should be satisfactory. Interesting information will be found in the volume on the subject of rabies and on the serum treatment of cancer. Indeed, Dr Bosanquet has done his work so thoroughly that it is hard to even indicate the practical value of his book in the short limits of a review. It contains a very perfectly digested mass of information in a very compact form, and it is not too much to say that there is not a superfluous word in it. It should form part of the library of every practitioner, and we hope it will meet with such support that it will be kept up to date in many succeeding editions.

A Manual of the Practice of Medicine. By FREDERICK TAYLOR, M.D., F.R.C.P. Seventh edition. Pp. 1065. London: J. & A. Churchill. 1904. Price 15s.

WE welcome a new edition of this useful text-book. A good deal of new matter has been introduced, and the volume is considerably larger than its predecessors. Perhaps this is inevitable owing to recent advances in medicine, and "Taylor" has a high reputation to maintain. At the same time, its popularity is due in some measure to the fact that it presents the subject within reasonable dimensions, and we hope that it will be possible in

future editions to keep the book up to date without further enlargement.

Clinical Diagnostic Bacteriology, including Serum Diagnosis and Cyto-diagnosis. By ALFRED C. COLES, M.D., D.Sc., F.R.S. Edin. Pp. 237. London: J. & A. Churchill. 1904.

THOUGH it might be difficult to suggest a better, the title of this work hardly gives an adequate idea of its contents. One-third of it is devoted to an account of the acid-fast bacteria embodying original work of considerable value.

For this part of the work we have nothing but praise.

The rest of the book is meant to aid "practitioners who have not had an opportunity of studying in a laboratory," and who "are still anxious to avail themselves of some of the advantages to be derived from a bacteriological examination." For the most part the book will be an adequate guide, and directions are simply and clearly put.

No description of either the typhoid bacillus or B. coli communis is given. We should have thought both of sufficient clinical importance to warrant some notice in such a book, and space might have been found by omitting some of the alternative methods of staining, say, the pneumococcus or gonococcus—one or two are all that most busy practitioners are likely to employ. The organisms more commonly met with are beautifully illustrated by two coloured plates, but we venture to think that the figures representing the parasites of ringworm, etc. (taken from Malcolm Morris, and evidently prepared by special methods), are not likely to be of much service to the uninitiated. Drawings of the appearances seen when *Liquor Potassæ* is the reagent used would be much more useful. The Widal reaction is well described. There is a short chapter on Cyto-diagnosis, in which the reader is referred to a French book or an American magazine for the technique of lumbar puncture.

On page 9, lithium *carbonate* is recommended as a counter-stain, and on page 210, *favus* is said to resemble a secondary syphilide. The words in italics are presumably meant to read "carmine" and "pityriasis." The whole work seems to us to fall short of the standard set by the author in his book on the blood, but it will be welcomed by the man who wants more information on practical bacteriology than he can obtain in most works on clinical methods, and who may be deterred by the somewhat forbidding terminology of modern times from tackling one of the larger books on the subject.

Practical Prescribing and Dispensing for Medical Students. By WILLIAM KIRKBY, sometime Lecturer in Pharmacognosy in the Owens College, Manchester. Pages, including Index, 177. Manchester: at the University Press. 1904.

THE author, in his preface, makes the following statement:—"It is not unusual to hear a complaint that medical students receive an education which is defective, in so far as relates to the writing of prescriptions." There is some truth in this statement, and since there is such a variety of "factory-made medicines," many practitioners have recourse to these instead of writing prescriptions. This is a book which must be of great use to students in learning to write prescriptions. It contains an excellent chapter on Incompatibility, a subject often not sufficiently studied. We notice that the author more than once prescribes together in solution lead acetate and tincture of opium, a common mistake with prescribers and should always be avoided. The lead meconate which is precipitated is an inert substance, and of course you lose the action of the lead—a liquid preparation of morphine should always be prescribed instead of the tincture of opium in lead mixtures.

The author, in his examples of prescriptions, frequently uses the genitive before the preposition "*ad*" instead of the accusative, which should be used—even in the same page we find the genitive in one prescription and the accusative in another prescription. There is a prescription at page 153 where we have

"Misce et adde
Aquæ ad ℥ vi."

This is wrong and should have been *Aquam*.

We would suggest that in any subsequent edition all the prescriptions should be in unabbreviated Latin, as many students are very deficient in the terminations of Latin words.

Manual of Gynecology. By D. BERRY HART, M.D., and A. H. FREELAND BARBOUR, M.D. Pp. xxxiv. + 736, with 12 lithographs and 359 woodcuts. Sixth edition. Edinburgh and London: W. & A. K. Johnston, Limited. 1904. Price 21s.

NO elaborate review is needed for a book so well known and so good, and in which a new edition only gives the opportunity of amplifying and preserving the merits of the old. Student and practitioner will find the new edition a convenient guide to the whole subject of gynecology, and one which is at once sound in its scientific part and sane in its practical judgments. There

are two notable omissions. The method of segregation of the urine which is more easily applicable for relatively inexperienced operators than vesical inspection, but was perhaps omitted because the rivalry of instruments is not yet settled. (2) The employment of the paravaginal incision which increases so much the access to the pelvic cellular tissue that the limits of the vaginal operation even in cancer have to be redrawn. We can hardly accept the adherence of the authors to the traditional position that the normal tube can rarely be palpated. If the examiner get the uterus well between his hands and let it slide to one side, then the finger tips have only the broad ligament between them, and on drawing them together up towards the pubic bone the tube can be felt as they glide over it.

A Complete Handbook of Midwifery for Midwives and Nurses. By J. K. WATSON, M.D. Edin. Pp. xvi. + 348. London: The Scientific Press, Ltd. 1904. Price 6s. net.

DR WATSON acknowledges the difficulty of defining the exact sphere of the midwife, and has aimed at providing her with "too much" knowledge "rather than too little." We have never heard any objection raised to the acquisition by the midwife of all the knowledge that is to be had. The way she knows and the use she makes of her knowledge are the points which, in practice, call for comment. When she has finished studying this book she may certainly know more than she need, but she is not likely to know too well. It is constructed to be used without a teacher, and the diagrams, the study of which is enjoined, do not always agree with the text (*e.g.* fig. 12 and p. 13).

Beri-Beri. Its Symptoms and Symptomatic Treatment. An Essay. By PERCY NETTERVILLE GERRARD, B.A., B.Ch., B.A.O., M.D., Dublin. Pp. 95. London: J. & A. Churchill. 1904.

THIS is a curious little book. It opens with five pages of crude diagrams representing sections of the spinal cord in normal and diseased conditions, and ends with a series of prescriptions. For the rest, the book consists of some miscellaneous information regarding beri-beri, and little paragraphs which might be found in any elementary work on clinical diagnosis.

The treatment recommended in fulminating (cardiac crisis) cases seems to us more heroic than safe, and we note that the discussion of prognosis is immediately preceded by a paragraph on the burial of beri-berics.

From the same publishers we have received a smaller book (53 pages) comprising extracts from the above. It is intended to serve as a guide to the symptomatic treatment of beri-beri. We cannot say it will be found indispensable.

Obstetrics for Nurses. By JOSEPH B. DE LEE, M.D., etc. Pp. 460, fully illustrated. Philadelphia, New York, London: W. B. Saunders & Company. 1904.

THIS is a somewhat pretentious book—spendthrift in illustrations, like most Americans, but these are its worst qualities, and it has some good ones. Rather more attention than usual is devoted to the ailments of young children. In a future edition judicious pruning might be of advantage, and it would not really harm the pupils to leave a little to their imagination.

The Human Sternum. By ANDREW MELVILLE PATERSON, M.D. Liverpool University Press. 1904.

PROF. PATERSON has in this book published the three Hunterian lectures delivered by him at the College of Surgeons of England in November 1903, dealing with the anatomy, morphology and development of the sternum. The sternum has hitherto been regarded as a segmental structure, composed of a series of segments, each developed in connection with a costal cartilage, but the author brings forward a quantity of evidence derived from a study of early stages of its development and of its comparative anatomy which is not in keeping with this view, but rather tends to associate the sternum with the shoulder-girdle. The most complete development of the bone is found in mammals whose fore-limbs are prehensile, and the author regards the sternum of quadrupeds as a degenerate form. This would mean that the primitive mammal was bipedal in its mode of progression, and that the quadrupedal type was derived from it, and not *vice versâ*, as is usually considered to have been the case. The evidence cannot be summarised or criticised here, but a word must be said in notice of the illustrations and of the general form of the book, both of which are most attractive. The whole volume contains a mass of information interesting to the morphologist and anatomist, and admirably put forward by the author in support of his views.

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QUESTIONS REGARDING THE STERILISATION OF DRESSINGS BY STEAM[1]

By A. A. SCOT SKIRVING, C.M.G., F.R.C.S.,
Assistant Surgeon, Royal Infirmary, Edinburgh

THE recent literature of the sterilisation of the skin and of ligatures is very large. This is not to be wondered at, since most surgeons agree, and rightly agree, that these sources of infection transcend all others in importance. On the other hand, not so much has been written of late years regarding the sterilisation of dressings, though much has been written on the subject in the past. I do not propose in these remarks on the sterilisation of dressings to refer to the simple and reliable methods of sterilisation by boiling or by immersion in antiseptic solutions, often the only methods available. I pass at once to consider some questions with reference to the more convenient but, it must be admitted, rather more complex, plan of sterilisation by steam.

Three difficulties present themselves to the surgeon desirous of making use of this method. The first concerns the steam itself, the second the steriliser, and the third the drums or caskets for the dressings. Of these, to my mind, the first is the greatest. For surgical purposes, steam can be made use of in motion, in equilibrium, under simple atmospheric pressure, and under pressures greater than that of the atmosphere. Further, we have to do with saturated and with superheated steam.

[1] The greater part of this paper was read before the Medico-Chirurgical Society, Edinburgh, on Nov. 2, 1904.

Now the subject of steam, I am informed, is not one of the easiest in physics. Its thermo-dynamics are, in fact, extremely complex. Unfortunately, also, the sterilising action of steam is intimately associated with such questions as the latent heat of steam, the hygroscopic properties of dressings, the factors influencing condensation, and similar problems. One cannot, therefore, avoid touching on some of these points, but, being without special knowledge on such purely technical subjects, I shall endeavour to refer to them as little as possible.

Saturated and Superheated Steam. — A good deal of ambiguity exists, I think, among surgeons as to the difference between these two steams, or, at any rate, as to what superheated steam really is. An idea commonly obtains that all steam under pressure, is necessarily superheated. This is, of course, not the case, although very frequently steam under pressure *is* superheated. On consulting the authorities with regard to these two steams, I find that saturated steam may occur under any pressure, provided its temperature has what may be called the "correct value." Saturated steam is steam which carries a certain amount of water in suspension or otherwise mixed with it, the temperature at which it is produced depending, of course, on the pressure. So long as this steam remains in contact with the water which produces it, its temperature is the same as that of the water; if the temperature be raised, the pressure will also be raised. Once away from the water, however, the temperature of the steam may be raised without altering its pressure. Steam which has obtained additional heat in this way is called superheated steam. Its temperature is above the temperature of saturation. If saturated steam be mixed with water (at the same temperature), none of the water will be evaporated; if the same thing be done with superheated steam, some of the water will be evaporated. When steam is saturated, a slight cooling or a slight compression is accompanied with liquefaction, and latent heat is disengaged. When steam is superheated, a slight cooling or compression is unaccompanied by condensation. Superheated steam is deficient or wanting in latent heat, upon the presence of which the value of steam sterilisation so largely depends.

There appear, however, to be different degrees of superheated steam, depending on how far the temperature of

the steam is above that of saturation. In this way it is possible that, with a low "grade" of superheated steam, some condensation may occur, and also that a small amount of cooling may be sufficient to bring it again into a state of saturation. The more superheated the steam becomes, the more does it approach the condition of a gas. A high grade of superheated steam probably differs very little from hot air. The simplest example of superheated steam is seen when the water in an autoclave or a steriliser having been all turned into steam, the heating process is continued. But superheating occurs in much less simple ways than this, and, indeed, is intentionally employed in certain sterilisers and in many disinfectors. These chiefly belong to the class of apparatus where steam in equilibrium is employed, and where there is an outer jacket in which steam is retained under a higher pressure and temperature than the steam in the interior. Braatz of Königsberg has also shown that in certain badly constructed patterns of the well-known Schimmelbusch-Lautenschläger steriliser, superheating takes place. The same observer, and also Borchardt and Rubner, have brought out the interesting fact that, if preliminary warming of the dressings to be sterilised be carried beyond a certain temperature before admitting the steam, superheating occurs, even although the steam admitted is only 100°C., and not under pressure. Borchardt, experimenting with cotton wool, found that after 70°C., superheating occurred, the temperature in the wool reaching 105.4°C., and remaining above 100°C. for over an hour. After forewarming to 80°C., 90°C., and 95°C., the temperature reached 108.8°C., 113°C., and 118°C. respectively. Experiments with wide-meshed gauze gave similar results, but a narrow-meshed gauze gave a higher temperature, viz., 116°C. after forewarming to 90°C. These differences depend probably on hygroscopic differences in the gauzes. I have found even engineers differing in their opinion as to what the nature of the steam entering a steriliser was, and, from what has been said, it will be evident that in the complicated system of piping unavoidable in many large institutions, it is not impossible for steam to receive additional heating on its way to a steriliser, and so to become superheated. Superheated steam may also be obtained by adding calcium chloride to water, which slightly raises the boiling point of

water at the ordinary pressure, and the steam therefore comes off at the ordinary pressure, but at a slightly higher temperature than 100°C.

The importance to surgeons of a knowledge of what superheated steam exactly is, and how ordinary steam may become superheated, lies in the fact that since 1888 a number of observers have drawn contrasts between the sterilising action of saturated and superheated steam to the great disadvantage of the latter. Thus Esmarch found that anthrax spores, killed in five minutes by saturated steam of 100°C., were not killed in thirty minutes of superheated steam at 110°C., nor in twenty minutes of the latter steam at 120°C. Rubner's results are even more startling, since he found that anthrax spores in superheated steam of 110°C. remained alive twice as long, in superheated steam of 120°C. thrice as long, and in superheated steam of 127°C. ten times as long as in saturated steam of 100°C. No doubt these results were obtained with superheated steam of a high "grade."

With regard to the value of steam under pressure, but not superheated, the researches of Christen, working under Tavel of Berne, are of special interest. He experimented with the most resistant earth spores known, and found that these spores withstood the action of ordinary saturated steam of 100°C. to an extraordinary degree. Globig had found he could destroy them in five to six hours, but Christen could not do so in sixteen hours. With steam under pressure, however, and slightly circulating, he was able to destroy the spores in five minutes at a temperature of 120°C. to 135°C., while only one minute's exposure to a temperature of 140°C. was sufficient to kill all the spores. He found that after 120°C. there is a sudden increase in the bactericidal power of the steam. In employing bacteriological tests to sterilisers, I have found the results of experiments, carried out under apparently exactly similar conditions, to vary a little. I suppose, however, that bacteria of the same species may differ in resistance, just as individuals do, apart from age, the material they have been grown on, etc. Considerable variations occur, apparently, in their resistance to chemicals. Thus, while Gärtner killed colonies of staphylococcus aureus in eight seconds by means of a 1-1000 solution of corrosive sublimate, Abbott found five

minutes necessary, and a few colonies survived even thirty minutes. The thermal death-point of the common non-sporing pathogenic bacteria would appear, however, on the whole to be pretty uniform. According to Sternberg, ten minutes of moist heat at 62°C. appear to be sufficient, though the staphylococcus aureus, when in a desiccated condition, requires a much higher temperature, viz., 90° to 100°C., or 80°C. for half an hour (Lübbert).

A recent writer has raised a further point, viz., whether bacteria (not spores) from a laboratory constitute a sufficiently stringent test material or not. This writer applies the term "effeminate" to such cultures, and apparently would accept with reservation any conclusions unless bacteria fresh from a wound were employed. On asking the opinion of two bacteriological friends on this point, I put the question in this way. If you had to be inoculated with bacteria from a wound or a tube, which would you choose? The answers are instructive. The first desired the bacteria from the wound, the second the cultivated organisms.

Air and Sterilisation.—Air, as is well known, is a most feeble germ destroyer. It is a bad conductor of heat. Its penetration is poor. Exposure to 170°C. for an hour is necessary to kill all organisms and spores, though non-sporing bacteria are killed after an hour and a half's exposure to 128°C. Pure air, luckily, seldom remains very long in a steriliser. It gets mixed up with the steam. The danger of such mixtures, however, are considerable. Thus, Rubner found that anthrax spores, killed after an exposure of three minutes to saturated steam, were still alive after ten minutes' exposure to a mixture in which the proportion of air to steam was 20 per cent. Further, spores were still alive after thirty minutes' exposure to a mixture in which the proportion of air to steam was 37 per cent.

The expulsion of air from sterilisers may be done by means of a vacuum, as in the sterilisers of the Kny-Scherer type, or it may be done by the entry of the steam. The removal of the air from the meshes of the dressings themselves also enormously favours the penetration of the steam. For this, steam in motion, whether under pressure or not, must be infinitely more efficacious than steam in equilibrium, even if

under pressure. It is a good plan, therefore, with sterilisers using the latter kind of steam, not only to open the exit pipe (referred to later), but also to keep it open for two or three minutes at the commencement of sterilisation.

The presence of air in sterilisers which work under pressure upsets, to a certain extent, the ratio between steam temperature and steam pressure. This should be remembered where the temperature is calculated from the amount of pressure indicated on the gauge.

I have lately carried out a number of experiments with a view to ascertaining the temperature obtained in the centre of various drums under different circumstances of time, pressure and packing. In the course of these, I learnt several pieces of information. My experiments were mostly conducted with those modifications of the original Schimmelbusch-Lautenschläger apparatus which act under pressure. Among other things, the fact was brought home to me that air is frequently either not let out at all, or insufficiently let out. For example, I found that in the self-heating low-pressure variety, so commonly made use of in "Homes," a difference of temperature exists, in some cases of as much as 30°C., between the top and bottom after five or six minutes, *i.e.* where air has not first been let out. This result was obtained by suspending maximum thermometers by a thread in the inside of these sterilisers. This difference in temperature was also observed, to a less extent, in experiments made with thermometers placed inside drums. As the sterilisation was continued, this difference tended to diminish, and after a long period of sterilisation the results were nearly the same in the top and bottom of the steriliser. When the air was let out at the beginning, on the other hand, there was much less difference between the top and bottom, showing that the upper part of the steriliser was generally fairly free of air, the lighter steam occupying the upper part of the steriliser from the first, the heavier air being displaced to the bottom. The air being a bad conductor of heat, took a much longer time to raise the temperature of the thermometer at the bottom than the steam did to heat the thermometer at the top. If anyone wishes to satisfy himself of the presence of air at the bottom of such sterilisers, he has only to neglect to open the lower air escape

pipe, and allow steam to accumulate for five minutes. If, now, he opens the escape at the top, only steam will rush out, whereas, if he opens the escape tap at the *bottom*, a rush of air will occur, followed, after a variable period of time, by steam. I have emphasised this point, as it is within my knowledge that this important point of letting out the air from the bottom of sterilisers is constantly neglected by nurses. Nor can we wonder that this is the case, since even instrument-makers, while supplying copious information on other points, entirely omit this one, which is most important if successful sterilisation is to be ensured. It is an interesting fact that in the old form of the Schimmelbusch steriliser, now so much discarded in favour of its pressure derivatives, this serious mistake was impossible of occurrence. In it the exit tube was open from the start, and steam at a pressure of only one-thirtieth of an atmosphere swept out all the air in the steriliser in the course of a few minutes, and afterwards ensured a continuous current of freshly generated steam during the whole period of sterilisation. In another of its derivatives, where the steam is supplied by branch pipes from the main pipes of hospital boilers, the steam only really circulates in the outer jacket, the interior of the steriliser merely gets the overflow, and the steam there circulates very much in the same imperfect way that blood circulates in a sacculated aneurism. In these sterilisers, too, it is easy for a new nurse to make mistakes with regard to the mechanism controlling the outlet and inlet pipes. I have known of drums placed in a steriliser in which no steam got into it!

In all the modern forms of Schimmelbusch's steriliser, there is a distinct difference of a few degrees between the temperature of the steriliser at the top and the temperature at the bottom, even after all air has been let out. The top part is the hotter, being nearest the more freshly generated steam. The lower part is, however, commonly supposed to be the hotter. Another point that cannot be too often insisted upon is, that drums must not be too tightly packed. Nurses are inclined to believe that steam can do anything. I have found that a difference of twenty or thirty degrees can be produced by stuffing a drum with too dense and too tightly rolled up material.

The Preliminary Heating, the Wetting, and the After-drying of

Dressings.—These questions are so bound up with one another that they may be taken together. Under certain circumstances dressings undoubtedly may become very wet during sterilisation. If saturated steam under high pressure be admitted into a chamber of lower pressure and lower temperature, considerable soaking of the dressings will take place. In some varieties of sterilisers without an outer jacket, employing circulating saturated steam, the dressings may be moist to a degree approaching actual wetness, and, for reasons not always easy to discover, they may be wetter at certain times than at others. In drums where the steam is admitted at the top and bottom and not at the sides, the water of condensation upon the cold metal lid of the drum or steriliser may wet the dressings to a considerable degree. Again, pools of water may form at the bottom of the steriliser. Much *indirect* wetting of this kind can be avoided by fixing a bit of lint immediately below the lid of the steriliser, and by inserting a low wire frame beneath the materials to be sterilised and the bottom of the steriliser. In some cases, through faulty construction of the exit pipe, distinct flooding may occur. On the other hand, where superheated steam is used, and especially where it is of high grade and where, therefore, little or no condensation takes place, the dressings may be absolutely dry at the end of the process. Whether this condition of absolute dryness has been obtained at too great a price depends, of course, on the view taken of the sterilising value of superheated steam. Most people will, I think, agree that if a satisfactory sterilisation has taken place the dressings should be distinctly moist at the end of the process. Personally I can see no real objection to slightly moist dressings provided they are sterile. Complaints regarding the wetness of dressings would probably occur less often if too large and too tightly packed drums were not employed, and if the drums were taken out of the sterilisers at once at the end of sterilisation, and rapid evaporation thus favoured. Instead of this, in some cases, they are left lying for a considerable time in the clammy interiors of sterilisers. I am not speaking, of course, of sterilisers where special means are taken for after-drying. Further, there is no necessity in a clean sterilising room, under the care of a trustworthy person, for the holes in the drums to be closed at once on removal.

[In one very ingeniously constructed steriliser the mere opening of the steriliser closes the drums.] The holes in the drums can be left open for some minutes. Even if a stray pathogenic organisms should happen to be in the neighbourhood, ready to be drawn in by the vacuum taking place inside the drum, it would probably not penetrate the outer towel in which the dressings should be enclosed. Moreover, this suction occurs, I think, at once, when the drums are being taken out of the steriliser and very little afterwards. In experimenting with current saturated steam in a steriliser of the simple potato steamer type, in which the steam enters from below, and also with the old pattern of Schimmelbusch, with the object of investigating the relative dampness, after sterilisation, of various materials (not inside drums), I have been struck with the great rapidity with which evaporation takes place, provided the dressings were taken out at once while hot. The moisture seems to vanish into the air. A roll of gauze, apparently very wet, becomes perfectly dry in a few seconds. Ordinary wool and wood wool wadding dry almost as quickly. Rolled up cotton operation towels take longer, and sometimes remain slightly damp in the centre. If unrolled, however, they too, dry at once. Brown holland operating coats take a still longer time, lint longer still, while flannel bandages never really part with all their moisture.

On the other hand, when these materials are not taken out of the steriliser for some time, even the gauze remains distinctly moist, and flannel is really quite wet. Space does not permit me to discuss the actual methods by which after-warming may be carried out, viz., by steam jackets, steam piping, the admission of hot air (not always filtered), and the like. I believe that in many cases such after-warming is not really necessary, though in certain cases it is.

With regard to forewarming, it will be seen from what has been already said that a danger exists if the forewarming be carried beyond about 60°C. Forewarming below that temperature, on the other hand, according to Braatz does not materially lessen the amount of condensation nor render the dressings less damp. Borchardt, however, who is a strong supporter of the old Schimmelbusch steriliser, believes that slight forewarming of the dressings is of service. Working with a

most useful steriliser for private work, designed by Mr Cathcart in 1890, which permits of forewarming to a slight extent if desired, I did not find that forewarming of the dressings themselves made much difference. It appears to me, however, that the forewarming of the *walls* of sterilisers is useful in preventing the indirect wetting of dressings which I have referred to above.

Drums or Kettles.—A large number of different patterns of drums exist. Of all these, the ones originally devised by Schimmelbusch have been the most popular. There are signs, however, that their popularity is on the wane. They have, undoubtedly, certain drawbacks. They lack simplicity, being provided with such things as hinges, shutters and bolts. These are apt to go out of order and require repairing. The lid very soon ceases to fit tightly, and in many cases a distinct interval exists between it and the drum. This interval is increased when the drum is lifted, especially in those patterns where the handle is attached to the lid in the wrong axis. Where two such drums are attached together, as in many hospital patterns, this defect is still further increased. Again, the shutter mechanism may be so tight that there may be incomplete exposure of the holes during sterilisation or incomplete closure after sterilisation is finished. In some cases the shutter is so loose that dust may easily get in. I have placed such a drum closed in a steriliser, and found the contents nearly as moist as when the holes were open. Moreover, the bolts connected with the shutter often fall out at unexpected times, even in new drums, and the holes they leave communicate directly with the interior of the drum and may escape notice for some time. In no way, therefore, can this drum be regarded as a perfect apparatus for storing sterilised dressings or for conveying them to an operation at a distance. If used immediately after sterilisation, these defects are, of course, of no importance. As regards the rapidity with which dressings can be sterilised, it may be said that if sufficient holes are present, if they are not too tightly packed, and if a specially rapid sterilisation is not required, these drums do well enough.

The drum figured here seems to me an improvement on that of Schimmelbusch and on many other patterns.[1] It gives

[1] This drum has been made according to my directions by Mr Gardner, Forrest Road, Edinburgh.

a more rapid sterilisation than the Schimmelbusch drum, and much greater safety as regards storage of the sterilised dressings, since it is practically hermetically sealed after sterilisation. This is, of course, a very great convenience in private work. It consists of an inner frame of wire-net—not a new idea it appears—but new to me. An interval of ¼ inch exists between this and the drum, allowing the steam to be in direct contact with the dressings everywhere. There is only one set of holes. These are exposed during sterilisation by raising the lid on three clips (which are so arranged as to grip the lid margin anywhere). The holes are completely covered up after sterilisation by simply pushing home the tightly fitting lid, which has a specially deep rim. From its construction, it is almost impossible for a nurse to neglect to open it before sterilisation, or forget to close it after sterilisation. The small hole at one end with screw cap I have now much enlarged. It was added as an additional safeguard, and also to permit any water of condensation to escape. The interesting point, however, about this drum, is the position in which it is placed during sterilisation. At first, I used to work with it in the ordinary position, the holes being at the top. In this position I found that sterilisation of the dressings at the bottom took a much longer time than with Schimmelbusch's drum. One day I turned the drum upside down, so that the steam now entered at the bottom. At once I found the whole character of the sterilisation had changed. I found that, working with simple circulating steam of 100°C. not under pressure, and with the drum fairly tightly packed with gauze, a maximum thermometer placed in the centre of the gauze and near the bottom (now the top), recorded over 90°C. in five minutes.[1] Further, the dressings

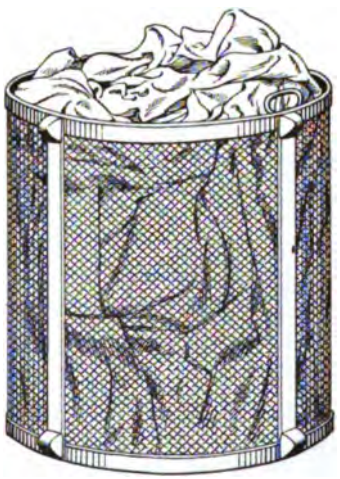

FIG. 1.—INNER WIRE CAGE.

[1] I have found that the temperature is more quickly raised in the interior of a packed drum with simple circulating steam, not under pressure, than it is when low

were quite moist. A second thermometer, similarly placed near the holes, gave only 80°C. When the position of the drum was reversed, only in the vicinity of the holes did the marker show 80°C. In the end remote from the holes, the mercury had not reached 70°C. (the lowest scale on the thermometers). A thermometer in Schimmelbusch's drum, under precisely similar conditions, also showed that the temperature had not risen as high as 70°C. Experiments with steam under pressure in various sterilisers and disinfectors

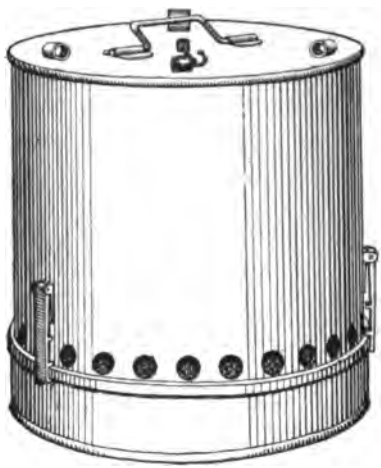

FIG. 2.—DRUM OPEN.

FIG. 3.—DRUM CLOSED.

confirmed these results. Dr Knott, Lecturer on Physics in Edinburgh University, kindly supplied me with the explanation of this rather curious phenomenon in steam sterilisation, which, so far as I am aware, has not been noticed in this particular connection before. When the steam enters below, convection occurs; when above, it does not. Convection, it will be remembered, is the physical principle which comes into play in bringing water to a uniform boiling point, the hot water rising to the top, and the colder water falling to the bottom, to be again heated in its turn. In the upright position, the dressings get their heat only

pressure steam in equilibrium is used. Of course, if the sterilisation is continued, a higher temperature is eventually obtained with the latter.

by diffusion and conduction. When upside down, convection is added. Sterilisation is therefore performed with this drum *upside down.* Possibly convection might be considered in the vexed question of whether steam is best admitted into sterilisers from above or from below. With this drum, with simple circulating steam not under pressure and with moderate packing, the boiling point is reached all over in fifteen minutes at the bottom of a Schimmelbusch steriliser. When placed in a large disinfector, side by side with a Schimmelbusch drum, I found a difference of at least 20 degrees in favour of the new drum, after fifteen minutes' exposure to a steam gradually rising to 15 lbs. pressure.

Braatz, in one of his papers, briefly refers to a drum he employs which this one seems to resemble. Braatz's drum, however, has apparently two sets of holes, above and below, and possesses even more rapid powers of sterilisation. I am, however, contented with the amount of sterilisation which convection enables this drum to perform, and do not wish to have another set of holes to guard. To favour evaporation, the drum should be placed in its proper position (not upside down), for a minute or two after sterilisation before closing the holes.

Concluding Remarks.—These investigations have strongly impressed me with the necessity of surgeons having a little more than a general acquaintance with the mechanism and working of sterilisers and surgical drums. When a steriliser is first installed, instructions should be obtained from original sources when possible, and not through intermediary persons. If one of the smaller sterilisers is used, the surgeon should satisfy himself that the person in charge really understands its proper working. In hospitals where a central sterilising room exists, a specially trained person is responsible for the sterility of the dressings, a strong argument in itself in favour of such an arrangement. Where a number of small sterilisers are employed, served by branch pipes from a main, there is a considerable risk of their supply of steam being interfered with through their reducing valves getting out of order, or the steam may be unexpectedly tapped or lessened from other causes. When, therefore, an independent supply of steam for sterilisation cannot be obtained, it is very necessary that gauges should be provided for all sterilisers working under pressure,

and thermometers for those not working under pressure. The same remarks, of course, apply to sterilisers which manufacture their own steam. Both gauges and thermometers should themselves be tested from time to time. Bacteriological tests should also be performed occasionally. In conclusion, for reasons which have, I think, appeared in the course of this paper, I would express a preference for the employment of saturated steam freely moving through the interior of a steriliser. If this steam cannot be obtained under pressure as well, which seems to be the most powerful combination, I am content with it under atmospheric pressure, provided sterilisation is not hurried nor the drums too tightly packed. The exact length of time in sterilisation depends so much on the variety of the steam, the steriliser, the drum, the packing, and the density of the fabrics to be sterilised, that each surgeon should determine this for himself, preferably by bacteriological experiment, and not by thermometric tests alone.

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SOME RENAL CASES[1]

By N. T. BREWIS, F.R.C.S.,
President of the Edinburgh Obstetrical Society

I DO not know if I should make an apology for presenting these cases. It may be asked, is the gynæcologist not a trespasser when he undertakes renal surgery? The kidneys cannot be considered peculiar to women, nor can the bladder; yet it is the daily practice of every gynæcologist to treat affections of the latter.

In the consideration of affections of the female generative organs the bladder cannot be disregarded, because it is so frequently involved in these disorders. The gynæcologist can hardly with propriety ask a surgeon to treat the bladder while he is treating the uterus, and I hold that if he treats the bladder he must also, of necessity, attend to affections of the kidney. Successful treatment of one depends in many instances on intelligent management of the other; and if it is absurd to have one specialist treating the bladder and another the uterus, it is equally so to have the lower part of the urinary apparatus under the care of one man and the upper portion under another. Moreover, it is essential to the gynæcological surgeon to be conversant with the surgery of the urinary organs, because it occasionally happens that they are involved in operations undertaken for the removal of uterine and ovarian tumours.

I am not one of those who think the gynæcologist should extend his sphere of action to all parts of the abdomen, but I do maintain that if he considers it right and proper to treat the bladder, he must also be prepared to treat the kidneys and ureters, which are so often the *fons et origo mali.*

My experience of renal surgery is not extensive; it includes —6 cases of Nephrectomy, 8 cases of Nephrotomy, 9 cases of Nephrorraphy, 2 cases of Nephro-lithotomy, 1 case of Nephro-ureterectomy; all were successful except one of nephrotomy for bi-lateral multiple septic abscesses. To-night I wish to narrate four of the more interesting of these cases.

LARGE PYONEPHROTIC KIDNEY.

Nephrectomy; circumference 48 *in.; weight* 45 *lbs.*

Mrs Mck., æt. 55.—The chief interest in this case is the great

[1] Read before the Edinburgh Obstetrical Society.

size to which the tumour attained and the length of time it took in reaching its huge dimensions. At the time of its removal the tumour had a circumference of exactly 4 ft., and the period of time during which the patient was known to have a renal swelling was twenty-five years.

As far back as 1872 the patient remembers that she suffered from what she calls "gravel," the urine frequently for a day at a time resembling strong coffee. In 1875, owing to an uneasy feeling which she had in her abdomen, she consulted the late Dr Angus Macdonald, who diagnosed floating kidney. Dr Macdonald gave her various prescriptions and the uneasiness gradually disappeared, but she felt easily tired and at times there was considerable thickness of the urine.

From this time till 1899, when I saw her at Dr Playfair's request, she had at frequent intervals what she terms "bad turns" with her urine. On these occasions she felt pain and the urine became thick and high coloured, and the attacks lasted from a week to three months. When the urine became clear the attack passed off. At one period there was no attack for a year. In 1888 she herself became conscious of a swelling in her right side which felt to her to be about the size of an inverted saucer. At this time she drew the attention of her medical attendant to the fulness. He called in a consultant who diagnosed renal tumour, which he said could not be removed, but he recommended tapping. This, however, was not done.

When I saw her in 1899 the abdomen was enormously distended by an irregularly shaped fluctuating tumour, which occupied nearly the whole of the abdomen. A resonant note could only be elicited deep down in the left flank. I thought its removal possible, but before deciding to do so I catheterised the left ureter, and, finding the urine from the left kidney to contain albumen and a few casts, after consultation with a surgeon who thought the operation should not be attempted, chiefly because he considered that the tumour was adherent to the vena cava, the idea of interference was abandoned at that time. "All the summer," to quote the patient's own words, "I was very unwell, and continued to be so the following winter. From then till the time of the operation, August 1901, I had a bad time; when a bad turn came on I was completely

under a cloud. I could neither eat nor sleep, and had great difficulty in lying in bed. I seemed unable to get a resting-place and sat most of the time on the side of the bed, although I was thoroughly exhausted for want of sleep. Whenever I lay down I felt as if I would be choked."

The patient being in this distressing condition, Dr Playfair and I reconsidered the case. The tumour had become more fluctuating, and, in the hope that the fluid might be contained for the most part in one loculus, we aspirated, but succeeded in withdrawing only one pint of pus.

This brought no relief, and as the patient's condition was now desperate, and it was clear that if relief could not be got her life could only be of short duration, we determined to give her a chance by operation. By this time the patient's heart had become greatly enfeebled and both lower extremities were œdematous. We knew, however, that the right kidney was functionless, that all the work was carried on by the left, and we were hopeful that if the tumour was removed, and the heart did not fail during the first forty-eight hours following the operation, we had a fair chance of saving the patient's life.

Operation.—Assisted by Drs Playfair, Clark, and Angus Macdonald, the operation of nephrectomy was performed in August 1901. The incision was a long transverse one extending from one side to the other. The tumour lifted up the posterior layer of peritoneum, and displaced the intestines into the left lumbar region. The adhesions were universal and over the greater part of the surface were firm and fibrous, and necessitated numerous ligatures. A portion of the wall of the tumour felt very thin, and great care was used to prevent rupture and contamination with pus.

In the lower part the tumour was so intimately adherent to the peritoneum that in separating the adhesions the cavity was opened into. After the tumour was liberated from adhesions the pedicle was tied and the kidney removed. The posterior layer of peritoneum was stitched into position, the opening in the peritoneum closed, the large raw extra-peritoneal cavity left after the removal of the tumour was stuffed with gauze, the end being carried through an opening in the loin. The wound was then closed with thick catgut

sutures. The patient made a satisfactory recovery and is now in excellent health.

DESCRIPTION OF KIDNEY BY DR SHENNAN.

Right Kidney.—Greatest circumference, 4 ft; greatest diameter, 15 in.; greatest width, 11½ in.; greatest thickness, 10 in.

Outer Surface.—General shape reniform with four well-marked main sulci radiating out from hilum. The surface of prominences between are regular and covered almost wholly with fibrous adhesions.

There is some fat in the hilum, and in the neighbourhood to a less extent. Fat is absent over the remainder of the surface except for small flattened patches.

The cystic character of the mass is distinct and the walls appear to be composed of dense fibrous tissue, which over one of the loculi is very thin.

The ureter can be still distinguished as a thick-walled tube —lumen about ⅛ in.—containing pus. It is bound down on the surface.

After fixation in formalin for four months, the mass was cut open longitudinally from convexity to hilum.

Section.—No kidney substance can be distinguished with the unaided eye; the general impression given being of a loculated cyst containing greenish gelatinous material (liquor puris), in the midst of which was a greyish-yellow deposit (pus cells).

Hilum.—Great increase of fibrous tissue in hilum, forming a triangular area, with base outwards (into kidney). Fat is seen in this in yellowish streaks amongst the fibrous tissue. The base of this triangle measures 2½ in., its height 3 in. From either angle of the base a thick fibrous band passes outwards and subdivides so as to form septa, which pass to join the outer wall at points corresponding to the sulci described on the surface, and these divide the main cyst into several loculi varying in size.

These loculi are distinct from each other, but communicate with the pelvis of the kidney by small rounded openings—the openings of the calyces—in relation to three of which rough calculi are present.

PLATE XI.—TO ILLUSTRATE MR BREWIS' PAPER.

Pyonephrotic Kidney.
Girth = 48 inches. Weight = 45 lbs.

To illustrate Mr Brewis' Paper.

Tuberculous Kidney and upper two-thirds of Ureter.

A large calculus obstructs the ureter, so that ureter as well as calyces has been blocked, with the result that all have been distended but especially the calyces, since from the presence of pus in the ureter, some has evidently been able to pass the calculus blocking it.

On removing the coagulated contents, the walls are covered for the most part with cretaceous material, in which a large proportion of uric acid can be distinguished.

REMARKS.

As far as I can ascertain, this renal tumour is the largest that has been put on record.

The view we take of the method of formation of this swelling depends on whether we regard the calculus as occurring secondarily to the dilatation, or the dilatation as secondary to the calculus. I think the former is the more probable, and that the following sequence has occurred: first, movable kidney, then hydro-nephrosis, then the urine becoming alkaline would be followed by phosphatic deposit and formation of calculi; and, lastly, the irritation set up by the calculi would produce the pus.

Three months after the operation she called on me looking exceedingly well and almost as youthful as the daughter who accompanied her, and told me that she had walked from the east end of Princes Street.

TUBERCULOUS KIDNEY (RIGHT) AND URETER. NEPHRO-URETERECTOMY. *Notes by* Dr R. A. J. HARPER, *House Surgeon.*

Before relating the following case I would like to state that I am greatly indebted to Professor A. R. Simpson for his kindness in allowing me to operate on the patient in his ward, and also for the valuable assistance he gave me at the operation; assistance which I feel satisfied ensured in a great measure the successful result.

K. M., æt. 32, i-para.

History.—Patient first noticed a swelling in right iliac region in January 1901, that is about eleven months ago. It was then of size of hen's egg, and of the same consistence as at present. It was not tender. Whenever patient lay down, she

felt as if the tumour were slipping back into right lumbar region. At this time, patient had no pain.

The tumour has gradually got larger, and patient has occasional attacks of pain in it, especially at her periods. She has no trouble in micturition. She has got thinner and weaker lately.

Previous Health and Family Health.—Good.

Sexual History.—Menstruation began at 13. Type twenty-eight days. Duration six days. Quantity moderate.

Morbid Menstruation.—No amenorrhœa, slight dysmenorrhœa. Menorrhagia for last three months. No leucorrhœa.

Pregnancies.—One, four years ago. Labour easy, and puerperium normal. Nursed baby for a year.

Other Systems.—*Heart*, normal. *Respiration*, slight dulness and blowing breathing at right apex. Breathing harsh at left. No subjective symptoms of phthisis. *Urinary.*—Pus and albumin in urine.

Physical Examination.—In the right lumbar region there is a firm movable swelling, which feels like an enlarged kidney. From its lower end a hard elongated structure about the thickness of the thumb can be palpated proceeding down in the line of the ureter as far as the pelvic brim. By vaginal examination the right ureter is felt distinctly enlarged to the size of the little finger. The left ureter is not made out. The uterus is in good position. The right ovary feels enlarged and hard. The left is not felt.

11*th Dec.*—Bladder examined by Kelly's method. The mucous membrane found to be congested. The orifice of right ureter was red and ragged looking. *Catheters* were passed up both ureters and urine collected separately.

Pathologist's Report on Urine.—Shows that tubercle bacilli are present in sediment from right kidney, absent from left. Dr Boyd to-day did the blood-freezing test. Freezing-point found to be 5.6 normal.

31*st Dec.*—Dr Brewis operated to-day. An incision made in kidney angle down to a little in front of anterior superior spine. The muscles were then separated, and the perinephric fat grasped with forceps and pulled up. The kidney at same time was pushed up into wound by pressure outside. The vessels at hilum were exposed and ligatured with strong silk,

and divided. The incision was then prolonged downwards to about middle of Poupart's ligament. The ureter, which was enormously thickened, was traced downwards. It was very adherent, especially at brim of pelvis, where it was attached to sheath of iliac vessels, and also to layer of peritoneum of posterior wall of abdomen. In dissecting it off, the peritoneal cavity was opened. The ureter having been fully dissected up, a pair of forceps were pushed up through vaginal roof and ureter caught. It was then ligatured and cut away. The lower cut end (about 2 in.) was pulled down into vagina. The opening in peritoneum was sewn up with catgut.

Gauze was now packed from wound through into vagina. The upper part of wound was also packed, and its end brought through at upper angle of wound. The abdominal wound was next sewn up with catgut, and a dressing applied. The cut end of ureter in vagina still being held in clamp was stitched with silk into vaginal roof. Gauze was now packed into vagina. Patient put to bed. Pulse fairly good.

Evening.—Patient doing well. Pulse 104 and good. Has little pain. Catheter at 8 P.M. drew off 10 oz. of urine. Patient complaining of thirst and to have saline enemata four-hourly.

1st Jan. 1902.—Patient restless all night. Slept none. Pulse 94. Temperature 99°. Feels fairly well, has no pain. Is still extremely thirsty, although having saline enemata every four hours, and by the mouth two teaspoonfuls of water hourly. Abdomen slightly distended. At 8 P.M. had passed total of 32 oz. of urine since operation.

Urine is acid. Specific gravity 1025. *Urea* 10 grs. per oz. Faint trace of albumin. Patient this evening still sleepless. Given trional 20 grs. by mouth.

2nd Jan. 1902.—Patient feels better. Slept fairly well. Discharge through dressings. These were changed. Pulse and temperature rather higher. Patient does not feel thirsty, and has passed about 80 oz. of urine in twenty-four hours. Given castor oil at 1 P.M. Had slight motion at 7 P.M. Turpentine enema at 8.30 with fair result.

11 P.M.—Patient now to have ℥ij milk every hour, and ℥ij brandy every four hours.

Urine to-day.—Specific gravity, 1020. Acid. No albumin, no blood. Urea 9 grs. per oz.

3rd Jan. 1902.—Patient feels well. Is passing urine freely. No pain. No headache.

5th Jan. 1902.—Patient feels well. Part of intrapelvic and of abdominal packing removed.

6th Jan. 1902.—Packing still further removed. Temperature goes up in afternoons to 99.4°. Patient feeling well. Appetite good. Is passing normal amount of urine.

7th Jan. 1902.—Clamp attached to lower end of ureter came away to-night.

10th Jan. 1902.—Patient chloroformed to-day and put in lithotomy position. Only stump of ureter left in vaginal roof. The uterus was fixed in position, and traction with volsella did not bring it down. It was found impossible to dissect away lower cut end of ureter as intended.

16th Jan. 1902.—Wound all but healed. Patient getting on well. Urine healthy.

25th Jan. 1902.—No tubercle bacilli found as yet in urine.

27th Jan. 1902.—Chest examined by Dr Gulland, who found some consolidation at both apices and a few crepitations at left.

3rd Feb. 1902.—There is some breaking down of upper part of wound. Tube put in and wound to be syringed out with tincture of iodine twice daily. Patient lying out on balcony all day, and being hyper-nourished. Getting petroleum emulsion.

16th Feb. 1902.—Wound looking better. Discharge less. Patient's appetite good. Respiration satisfactory.

14th March 1902.—Patient progressing very favourably. No cough, no spit, and no night sweating. Eats very well and is gaining weight. Patient left hospital to-day, is to continue dressing wound at home, and to live an open-air life.

Description of Kidney and Ureter by Dr Stuart MacDonald.

The kidney is enlarged; on section there is an irregular cavity in the lower part of the kidney measuring 1½ in. by

¾ in.: its walls are ragged and lined with caseous-looking matter. The cavity contains blood-stained caseous "débris." The cavity is in direct communication with the pelvis of the kidney, which is not dilated to any extent, though its lining membrane is thickened and ulcerated and it contains débris similar to that in cavity. In the upper part of the kidney there is a similar irregular cavity measuring 2 in. by ¾ in. with similar contents and walls: it also communicates directly with the pelvis. Towards the centre of the kidney a dilated calyx with early ulceration of wall is also seen. The cortex of the kidney is pale throughout. The structure is not well seen; there are a few small caseous areas scattered throughout; these are indistinct and better seen in the medullary region. There is an excessive deposit of fat in the neighbourhood of the pelvis. There is much cicatricial enduration and thickening extending down from the pelvis along the ureter. The ureter is enormously thickened 3 in. below the kidney, the wall of the ureter is fully ¾ in. thick, the mucous membrane is ulcerated.

Microscopical Transverse Section Wall of Cavity in lower part of Kidney.—Cavity is lined by tuberculous granulation tissue; giant cells very scanty; caseation slight; granulation tissue very vascular, much associated interstitial fibrosis of kidney. *Transverse Section of Ureter* shows extensive fibrous thickening of wall; the ureter is lined with vascular tuberculous granulation tissue with numerous giant-cell systems.

Remarks.

This case demonstrates the value of catheterisation of the ureters. By no other method could we have determined that the urine from the left kidney was free from tubercle bacilli. We were aware that the absence of the bacilli from the urine was not conclusive evidence that the left kidney was free from tubercle, but, taken in conjunction with evidence got from the bladder, viz., in the inflammatory condition limited to the mucous membrane surrounding the orifice of the right ureter, we inferred that the disease was practically confined to the right kidney and ureter. The subsequent history of the patient has shown this view to be correct. When she left hospital the urine was free from tubercle bacilli, her health has

gradually improved since, and a letter received from her last week states that she feels quite well and strong.

Adenoma of Suprarenal Body. Removal of Tumour and Kidney.

Mrs C., æt. 41, has had six children, the youngest being three years old. The patient was referred to me by her doctor on account of an abdominal swelling which had been noticed for about seven years. She has felt a pain in her right side and has been easily tired for four or five years, and during the last three years she has lost about 2 stones in weight. She has had four attacks of hæmaturia. The first attack occurred 7½ years ago; she was unable to void urine for about twelve hours, the pain was severe and with the urine a little blood was passed. The second attack took place four years later, lasted a week, and as during the first there was hæmaturia with severe pain. In May 1902 she had her third seizure. On this occasion there was no pain or difficulty in micturating but a considerable amount of blood was passed. The last attack happened in October last. A large quantity of blood was passed with little pain. The patient says these attacks came on after exertion or chill. Of late there has been slight menorrhagia.

Physical Examination.—A swelling is seen occupying the right lumbar and the umbilical regions. It is hard in consistence, irregular in shape, uneven on the surface, and freely movable. The tumour extends into the left flank and the ascending colon passes over its anterior surface.

On vaginal examination the uterus is felt retroverted and separate from the tumour. On 26th January 1903, the ureters were catheterised, and the following report was got from the examination of the separate urines:—

Urine from the Bladder.—Specific gravity 1020. Reaction acid, urea 1.8 per cent. No albumen present. Deposit consists of bladder cells and a yeast.

Urine from Right Kidney.—Specific gravity 1016. Reaction acid, urea 1.9 per cent. Deposit consists of red blood corpuscles and a few cells from pelvis of kidney or ureter.

Urine from Left Kidney.—Specific gravity 1021. Reaction acid, urea 1.8 per cent. Deposit consists of red blood corpuscles, a considerable number of leucocytes, and one or two cells from pelvis of kidney or ureter.

The tumour was considered renal, and lumbar nephrectomy was performed January 1903. The operation proved a severe one, and recovery was slow. The cavity was drained with gauze through the loin and a sinus formed which discharged for about two months. After her return home the patient became depressed and melancholy, and later on had delusions and suicidal ideas. One day walking with her sister she ran off and threw herself into the river and was drowned.

Description of Tumour by Dr Shennan.

Measurements at present time (February 1904).—Length 7 inches or 19 centimetres; breadth 7⅛ inches or 18 centimetres; thickness 3½ inches or 9 centimetres; it is now somewhat flattened.

Appearances.—It forms a flattened nodular mass with rounded projections of varying size, one of these being the remains of the kidney which projects at one angle and is also spread out in a thin layer over one of the surfaces to about a quarter the extent of that surface.

The original colour is now lost. On section the greater part of the mass consists of new growth sharply demarcated from the kidney and encapsuled. Thin fibrous trabeculæ stretch inwards from the capsule. These meet and form towards the centre of a somewhat close network. In the irregularly rounded or oval meshes of this there is soft new growth in masses of varying size. The larger nodules are breaking down and in some there are dark areas, the result of hæmorrhage, whilst in others towards the centre there is an appearance of caseation.

When of more recent formation they are seen to be subdivided by very delicate partitions which give them a reticulate glandular character.

The kidney is not invaded, and so far as can be made out, the growth has probably begun in the neighbourhood of the

pelvis, stretching the kidney over it. The ureter can not be made out.

Microscopic Examination.—Under the microscope the tumour is made up of masses of more or less polygonal epithelial cells. No lumen can be distinguished. They are separated by extremely delicate bands of connection tissue which contain channels, some of them blood capillaries, others lymphatic. These in the denser parts of the tumour appear simply as chinks separating the masses of cells.

Cells.—The nuclei are rounded. The protoplasm is finely granular and stains deeply with eosin. Many of them are degenerated, showing either fatty change or granular disintegration. In the distinctly necrosed part of the tumour they completely fail to stain. Many of the cells possess several nuclei and some of these are larger than the average. Their arrangement is very similar to that found in the glomerular or reticular zone of the cortex of the supra-renal gland.

In the capsule and in the thicker bands of fibrous tissue there are collections of golden brown pigment, chiefly lying in the large cells and apparently of hæmatogenous origin. The structure, naked eye and microscopical, is that characteristic of a supra-renal rest tumour or hydronephroma.

Kidney Splitting for Hæmaturia.

Mrs H., æt. 43, viii-para, youngest child three years old. The patient first noticed blood in her urine four years ago, and ever since it has recurred at short intervals. Before the birth of her last child she was confined to bed for thirteen weeks on account of it. The labour was natural, but the urine did not clear up. Since the beginning of this year (1903) the bleeding has been constant. The patient was admitted into my Home in April 1903, and while under observation there, the urine was uniformly blood-stained, but often large quantities of blood passed and formed clots. Attacks of faintness attended these larger losses.

On 29th May the bladder was examined with the cystoscope and the ureters catheterised. A pool of blood was seen lying in the bladder, but when removed the walls appeared healthy. Blood was seen coming from the left ureter, while that from

the right was clear. Catheters were passed into the ureters and urine obtained from each kidney. A catheter specimen had previously been got from the bladder. The separate specimens were sent to the Laboratory of the Royal College of Physicians, and the following report was received :—

Urine from Bladder gives acid reaction, considerable quantity of albumen. Deposit consists of yellow pigment in granules (altered hæmoglobin), leucocytes and shadows of red corpuscles.

Urine from Right Kidney gives acid reaction. Urea = 1.2 per cent. Traces of albumin. Deposit consists of masses of epithelium of pelvis or ureter, altered red blood corpuscles, leucocytes, uric acid crystals single and in masses, amorphous urates ?

Urine from Left Kidney gives acid reaction. Urea = 1.1 per cent. Traces of albumin. Deposit the same as from the right kidney, but red cells more numerous and more altered, nearly all shadows, and leucocytes more numerous and brown amorphous deposit of altered hæmoglobin.

Operation.—The usual lumbar incision was made, and the kidney brought into view after considerable difficulty owing to its being intimately and universally adherent. The organ was found to be uniformly increased in size, otherwise it presented a normal appearance, with the exception of an area about one shilling piece in extent where the capsule was raised in the form of a bleb under which the kidney substance was soft.

A longitudinal incision in the middle line through the whole substance of the kidney, dividing the organ into two halves, was made, and the pelvis explored. Nothing abnormal was found in the pelvis, but the kidney section presented the appearance of chronic interstitial inflammation. Therefore the two halves were brought into apposition and sutured loosely by six or eight catgut sutures. The kidney was then put back, a drain introduced, and the wound closed.

The patient made a good recovery, the blood disappeared from the urine ; on 23rd June there were very slight traces of albumin, and when she left the Home on 30th June there were none. Ever since she has improved in health, and on 1st November 1903, six months after her operation, when she came to show herself, there was neither albumin nor blood present.

REMARKS.

In this case I unwittingly operated, as Harrison did in his first three cases, on a patient suffering from nephritis. The large quantities of blood which the patient passed, the absence of casts in the urine, and the fact that on cystoscopic examination blood was seen trickling from the left ureter, and not from the right, misled me. When I incised the kidney I expected to find a calculus or a malignant growth, and it was only after these were found to be absent that the true state of affairs was recognised. On questioning the patient subsequently it was found that eight years ago she had a slight attack of scarlet fever. The operation, however, cured the patient. It is interesting to note that splitting of one kidney was sufficient to afford relief to both.

THE INFLUENCE OF ADRENALIN AND THYROID EXTRACT ON THE METABOLISM IN DIABETES MELLITUS

By D. NOËL PATON, M.D., F.R.C.P.

(From the Research Laboratory of the Royal College of Physicians of Edinburgh)

1. *Adrenalin.*

THE discovery of the production of glycosuria by the subcutaneous injection of adrenalin and other preparations of the supra-renal bodies in dogs, rabbits and birds, makes it a matter of considerable interest to determine how such preparations will influence the course of diabetes in man.

Morphia, it is well known, in large doses causes glycosuria in the healthy individual, while in the diabetic it markedly checks the excretion of sugar. This Pflüger explains as follows :—

"Morphia causes glycosuria in the healthy and diminishes it in the diabetic. This fact, puzzling at the first glance, is simply explained when one takes into consideration that the regulation of sugar production in the liver, similarly to the heart beat, is maintained through augmenting and inhibiting forces. Morphia stimulates both kinds of forces in the healthy, but the augmenting force which increases the sugar production

is influenced more strongly. In the diabetic this augmenting force is in constant work, and is consequently weakened. The morphia, however, always acts upon both kinds of force, but here the inhibiting has the upper hand."

Does adrenalin act in a similar manner or is its mode of action different from that of morphia?

Apart from any possible action on the sugar-regulating mechanism of the liver, whether direct or through the pancreas, theoretically it might appear that a substance which like adrenalin exercises a tonic effect on the muscles should increase the utilisation of sugar by the economy and thus decrease its excretion in diabetes.

To determine this point the following observations have been made on patients suffering from diabetes, and they show very clearly that any expectation of a beneficial action of adrenalin similar to that of morphia is without foundation.

For these cases I am indebted to Drs James and Gibson, and I desire to record my thanks to the Resident Physicians, Dr Matthews and Dr Henderson Smith, to whom I am indebted for every assistance during the prosecution of the investigation.

Methods.—The nitrogen of the urine was determined by Kjeldahl's method, and the glucose by titrating with Fehling's solution.

The first case studied was a mild one.

CASE I. A. S., aged 15, was admitted on October 7th, 1903. He had been ill for three weeks and was passing about 410 grm. of glucose per diem. On a diabetic diet the sugar fell to about 100 grm. per diem, and under codein it had fallen in the beginning of December to about 10 grm. per diem.

The diet consisted of:—

	Weight.
Ham	½ lb.
Eggs	3
Gluten Bread and Butter	not stated.
Beef	1 lb.
Beef-tea	not stated.
Vegetables	not stated.
Cream	1 gill.
Milk	1 pint.

The codein was stopped, and when he came under observation on December 9th, he was passing on an average, taken over eight days, 48.74 grm. of glucose with 11.74 grm. of nitrogen per diem. The urine gave no reaction with perchloride of iron.

From December 17th to December 21st, 0.5 c.cm. of adrenalin chloride (Takamine 1 in 1000) was administered subcutaneously twice daily.

Table I. gives the average daily excretion of nitrogen and glucose in grms., and the relation of these to one another.

TABLE I.

Average excretion *per diem* in grms.

	Nitrogen.	Glucose.	Nitrogen to Glucose.
8 days before . .	11.7	48.7	1 to 4
5 days under 1 c.c. adrenalin	13.1	66.9	1 to 5

It will be seen: (1) That the excretion of glucose is markedly increased. (2) That the excretion of nitrogen is increased. (3) That the excretion of glucose is increased out of proportion to the excretion of nitrogen.

CASE II. was that of a man of 43 years of age, who had been ill for a little more than a year. When admitted he was passing about 260 grm. of glucose per diem. From the first the urine gave the diacetic acid reaction.

He was put for seven days on the following diet without further treatment.

	Weight.
Toast	14 oz.
Ham	4 oz.
Milk	2 pints.
Chicken	10 oz.
Green Vegetables . . .	4 oz.
Beef	8 oz.
Butter	not stated.

From the eighth to the twelfth day adrenalin chloride (Takamine 1 in 1000) was given subcutaneously in 0.75 c.cm. doses, for the first three days twice daily, and for the last two days thrice daily, *i.e.* 1.25 c.c. and then 2 c.c. per diem.

It was then stopped for two days.

TABLE II.

Average excretion *per diem* in grms.

	Nitrogen.	Glucose.	Nitrogen to Glucose.
7 days before . .	17.7	240	1 to 13
3 days under 1 c.c. adrenalin	19.7	333	1 to 16
2 days after . .	19.1	256	1 to 13

Both cases show that so small a dose as 0.016 c.cm., *i.e.* .016 mg. of adrenalin, per kilo of body weight causes a marked increase in the excretion of sugar and a less marked increase in the proteid waste; that in fact adrenalin acts upon the metabolism of the diabetic as it acts on the metabolism in health.

2. *Thyroid.*

It seemed possible that the administration of thyroid gland, or extracts of the gland, from their influence in increasing the metabolism of proteids and of fats, might also increase the metabolism of sugar in diabetes. To test this the patient upon whom the last set of observations were made was given tabloids of thyroid (Burroughs, Wellcome & Co.) for six days in doses increasing from .5 grm. to 10 grms. per diem. Symptoms of thyroidism supervened with a threatening of diabetic coma and the drug was discontinued.

The results are given in Table III.

TABLE III.

Average excretion *per diem* in grms.

	Nitrogen.	Glucose.
7 days before adrenalin . . .	17.7	240
3rd, 4th and 5th day after adrenalin was stopped	17.3	222
6 days under thyroid . . .	17.0	233

The administration of even large doses of thyroid extract in this case did not modify the excretion of glucose or of nitrogen.

THE ALTERNATING SINUSOIDAL CURRENT. ITS ADMINISTRATION BY MEANS OF THE BATH

By A. DINGWALL FORDYCE, M.D., F.R.C.P.

THE general appreciation of the powerful remedial means at the physician's command in the world of electricity is comparatively recent, and the methods of procedure and their practical application are constantly becoming more and more diversified and widespread, so that endless scope for enquiry is offered to workers in the subject—a subject beset with many difficulties and somewhat bewilderingly clothed in a phraseology all its own.

The importance and value of many of the results obtained have naturally resulted in a great branching out of the subject, and the introduction of numerous novel methods of treatment, many of undeniable value, some of very questionable utility.

In the case of the procedure of which I wish to speak, the electric current is applied to the body through the medium of water in a bath, two chief methods of such application being in vogue—the monopolar and the dipolar.

In the former, one pole is connected with the tub in which the patient is placed, if this is of metal, or passed into the water if the vessel is of some non-conducting substance, as of wood. The current entering the water is conducted to the entire surface of the body that is in contact with the water, and passes out by means of an iron bar covered with wet chamois skin, which is grasped in the hands.

By means of this arrangement it is evident that all the current passing from all parts of the patient's body in contact with the water is finally concentrated in the arms before passing to the other electrode, and thus a current which causes severe contraction of all the muscles of the hands and arms is so spread over the rest of the body as to be barely perceptible.

In the dipolar method of administration, the body of the patient does not come in contact with either of the electrodes, but these are immersed in the water, one at each end of the tub, which must be of some non-conducting material. In this way the whole of the current does not pass through the body, the amount which does pass varying with the temperature and

amount of the water. The temperature at which the bath is usually given varies from 90° to 100° F., the patient remaining in it for 10 to 30 minutes.

Now while it is evident that in the monopolar method the exact amount of current passing through the patient's body is accurately known, in the case of the dipolar method this is not the case, and as yet no accurate estimate has been arrived at by the various observers on this point.

For the purpose, therefore, of general equable electrisation throughout the body, the method of application by means of the dipolar form of bath is eminently fitted, as by it the disadvantage of concentration of the current at one pole is avoided.

By such a method it is obviously possible to convey to the patient any current desired, be it galvanic, faradic, sinusoidal, or what it may.

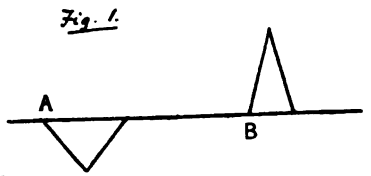
Reports by observers on the therapeutic effects of electric baths serve to show that the stimulating, sedative and tonic effects of electricity are obtained more or less by all forms, while the baths can be borne by temperaments that will not bear ordinary electricity. Their application causes a tendency to diminution of the pulse and respiration rates, and also to lowering of the temperature, and exerts a powerful, invigorating and refreshing action upon the body generally.—(Eulenburg, Lehr, Schleicher, V. Corval, Wunderlich.)

In the case of the alternating sinusoidal current, certain characteristics mark it off distinctly from other varieties of current. D'Arsonval—who introduced it into the province of practical therapeutics—was first led to its study by observing the importance of what he terms the "characteristique d'excitation." He recognised the mistake made by thinking that one has completely defined an electric stimulation from the physiological point of view by knowing the strength, or ampèrage, and difference of potential, or voltage, of the current employed, as these two factors merely give the amount of energy liberated by the apparatus at the moment of discharge.

If one apply suddenly a current of high voltage and ampèrage, violent muscular contraction results, while if the current be applied slowly, gradually increasing up to the same strength, the effects are much less marked.

A third factor, therefore, has to be taken into consideration when defining completely from the physiological point of view the electric stimulation. This factor is time.

In examining a single electric stimulation, such as that from the induced current on breaking a primary circuit, it is evident that the electric variation leaves a potential of zero to attain a maximum potential, and then returns to zero. It can therefore be graphically represented by portraying the variations of potential on an axis at right angles to an abscissa, on which figure the variations of time. This curve it is which D'Arsonval calls the "caractéristique d'excitation." Such a graphic representation of the faradic or induced current may therefore be presented thus (see Fig. 1).



Induced currents on—
A, making primary circuit.
B, breaking primary circuit.

Here on making and breaking the primary circuit this induced current is obtained, consisting on each occasion of equal quantities of electricity of opposite sense. Now while both these induced currents are termed momentary, it is found that as a matter of fact the current induced at the making of the primary circuit lasts nearly twice as long as that produced at its breaking, and in the interval between the two no current passes. Physiologically the former current is practically a negligible quantity owing to the slightness of its effects, while the latter current it is which produces the characteristic effects of the faradic current. In this current of rupture the curve rises very abruptly, and for this reason such currents cause contraction and tetanisation of muscles. By lengthening the time relatively to the increase of potential, D'Arsonval succeeded in completely modifying the physiological effects of the current.

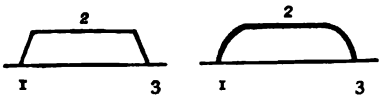
In the case of the galvanic current again, the curve of make and break may be either abrupt or gradual, the representation of the current between the two being a line parallel to the zero abscissa (see Fig. 2). The alternating sinusoidal current may be depicted thus (see Fig. 3).

As its name implies, the graphic representation of the current shows it as consisting of a series of double curves in

opposite senses of the nature of sines. Taking the zero line AB to represent the lapse of time, the ordinates on this abscissa represent the intensity of current at each period of it, those beneath being of positive sign and those above negative.

Commencing from an intensity of zero at A, the current increases gradually and evenly in a positive sense to a maximum intensity at Y, from which it in like manner decreases to a zero intensity at α, to again rise, though in the opposite or negative sense, to a like maximum intensity at Z, from which it returns once again to zero at β.

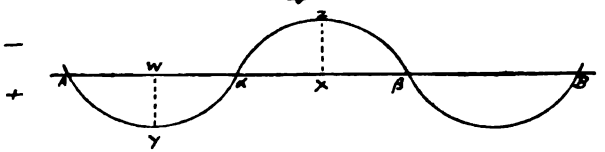
Fig. 2



Galvanic current—1, Make; 2, Period of flow; 3, Break of current.

Obviously here, therefore, we have to deal with no abrupt rises of potential, and, owing to the evenness in variation of

Fig. 3



Alternating sinusoidal current.

intensity of the current, the minimum amount of shock is administered to nervous structures, so that currents of considerable strength can be applied without producing muscular contraction or marked sensory phenomena. Consisting of a series of curves as depicted above, the frequency of the current—which in bath treatment never exceeds 40-50 per second—is determined by the number of stimulations per second—A to α representing one such stimulation. Owing to the equal quantities of opposite electricities employed, neither electrolysis nor polarisation can take place in the tissues.

To obtain the current an electro-magnetic machine is employed, in which, enclosed by a horse-shoe magnet, is a ring of soft iron completely encircled by a series of loops of a continuous coil.

This ring with its encircling coil is so constructed as to be capable of rotating evenly. A continuous current from a battery is connected with the encircling coil, thereby causing magnetisation of the enclosed soft iron ring. By its position between the branches of the horse-shoe magnet the ring acquires, by induction, poles at the two ends of a diameter at right angles to the centre of the surface of the two branches of the magnet, and thus, when rotation occurs, by tapping the current from two opposite coils of the ring, an alternating sinusoidal current is obtained.

When employing such a machine for bath treatment, the strength of current used for adults, while varying in different cases, is as a rule of from 10 volts 50 milliampères to 20 volts 100 milliampères.

D'Arsonval claims for the current a very powerful invigorating action on the nutrition of the tissues, evidenced by the increase of respiratory gaseous exchanges, and a special action on unstriped muscle fibres, without the disadvantages of painful sensory phenomena or muscular contraction.

Gautier and Larat made observations on 200 patients, and concluded that besides a general tonic effect the treatment has a powerful influence on impaired nutritive functions. In cases of chlorosis, spinal neurasthenia, rickets, and muscular dystrophy, they achieved marked success, while improvement to a greater or less degree was also noted in such a variety of affections as obesity, chronic rheumatism, lumbago, torticollis, eczema, and urticaria.

Professor Bernhardt, however, was led to take a less bright view of the results obtained, and states that he was able to obtain no certain results as regards metabolism, but found that the current diminished pain and aided the reabsorption of pelvic exudations when locally applied. In muscular atrophy he found it only of service when there was no reaction of degeneration, but merely a quantitative diminution of electric excitability.

In its local use Apostoli, Kellog, and Kaplan-Lapina have reported certain beneficial results.

Von Corval and Gaertner, while dealing much with electric baths, would not seem to have made use of the alternating sinusoidal current, but Cohen states: "For all therapeutic

stimulation of muscular tissue, when little or no sensory stimulation is desired, the sinusoidal current should be chosen; and then it should be the current, *par excellence*, for improvement of muscular nutrition when this is impaired by a failure of proper stimulation. It will therefore be found useful for the production of muscular contractions in all forms of nerve degeneration in which faradism is incapable of producing contraction, in many nutritional disorders, and in hyperæsthesias of a functional nature."

Observations on a considerable number of cases enable one to corroborate certain of the previous reports.

As regards the effect of treatment on the temperature, pulse rate and respiration rate, the following figures are derived from the results of administration to a healthy individual:—

No. of Bath.	Nature of Bath.	Duration of Bath.	Temperature of Water.	Strength of Current.	Temperature.		Pulse.		Respirations.	
					Before.	After.	Before.	After.	Before.	After.
1	Alternating sinusoidal current	15 minutes	100°-98°	Up to 10 v. 50 m.	97.6	99	84	95	12	13
2	,,	,,	96°-94°	,, 10 v. 50 m.	98	98.8	90	86	12	12
3	,,	,,	98°-95°	,, 10 v. 50 m.	98.2	98.8	90	88	11	11
4	,,	,,	93°-91°	,, 15 v. 75 m.	98.3	98.2	90	75	12	11
5	,,	,,	92°-90°	,, 12 v. 62 m.	98.6	98.4	85	80	11	10
6	,,	,,	93°-91°	,, 15 v. 75 m.	98.2	97.8	86	78	12	10
7	,,	,,	99°-97°	,, 10 v. 50 m.	97.4	97.9	76	73	11	9
1	Plain	,,	99°-96°	None	97.8	98.2	76	76	10	10
2	,,	,,	93°-91°	,,	98.6	98.2	80	78	12	12

Prior to entering the bath, fifteen minutes' absolute rest on a couch was enjoined, at the conclusion of which time an examination was made of the temperature, respiration and pulse.

The patient then entered the bath, and the temperature of the water was noted before turning on the current. The duration of the bath was always fifteen minutes, and at the close the temperature of the water was again noted and the current turned off. Then before moving from the bath the patient's temperature, pulse rate and respiration rate were again carefully tested.

From the above figures it appears we may conclude that after the administration of a sinusoidal bath by the dipolar method—

1. The effect on the temperature is mainly due to the temperature of the water.

2. There is produced a diminution of the pulse rate to a degree varying according to the strength of current employed.

3. There is a tendency to diminution of the respiration rate.

4. Results Nos. 2 and 3 may be quite obscured by external mental impressions, *vide* bath one, accompanied by altogether novel and somewhat unpleasing sensations.

In the case of sick persons, the results noted showed :—

1. That in 85 per cent. of the cases the temperature varied according to the temperature of the water.

2. That in 71 per cent. of cases the pulse rate was increased.

In 89 per cent. of baths of a voltage over 15 the pulse rate was increased, as also in 70 per cent. of baths of a voltage under 15, and thus the tendency to increased pulse rate was more marked the stronger the current employed.

3. That while the stronger currents showed the greater tendency to increase the pulse rate, this increase was a deviation from the normal.

4. That the respiration rate, while affected to a less extent than the pulse rate, was in the majority of cases affected in a like manner with it.

5. That the effects of the current on pulse and respiration rates, as noted on a normal individual, were readily overborne by mental impressions in cases of sick persons.

Several cases of infantile paralysis were treated by this method, and it was noted that in those cases of comparatively short duration—four to six months—and where electric examination disclosed a diminution of reaction of the affected muscles to galvanism and faradism, but no reaction of degeneration, marked though gradual improvement occurred. The paresis steadily improved, and the electric reactions gradually approximated to the normal.

On the other hand, in cases of eighteen months' duration and longer, and where reaction of degeneration was present, no direct local improvement whatever was noted. In such cases, however, it was observed that during treatment, where the patient's previous general condition was markedly poor, general

improvement occurred, specially noticeable in the circulation in the affected limb.

Such general improvement was even more noticeable in cases of rickets, the previously backward children gaining more rapidly in weight, commencing to sit up, walk, etc., and in general showing unmistakable evidence of increased strength.

In cases of neurasthenia, treatment on the whole proved satisfactory, appetite was increased, pain was eased, and sleep improved; while on the other hand, hysteria was in no way beneficially affected.

In the treatment of sciatica very various results were obtained. In some cases it was found that after the administration of a bath the patient was comparatively free from pain for eight to ten hours, the pain, however, then returning and being as severe as formerly. In other cases, again, the pain was immediately intensified on the application of the current.

Distinctly favourable results were obtained in rheumatoid arthritis.

These were manifested by a marked lessening of pain and consequent improvement in mobility, stimulation of the digestive functions, and a certain noticeable return of a feeling of *bien-aise.*

One case of pseudo-hypertrophic paralysis was subjected to this treatment. Previously slight improvement in the condition had been observed, and under treatment this became appreciably more rapid.

That the general effects produced by a course of sinusoidal baths are tonic, with a certain sedative effect on pain, and consequently, improved sleep, seem to be the outstanding facts.

At the same time the conclusion almost forces itself upon one that, as the factor *time* in the case of the current has been defined by D'Arsonval as the "charactéristique d'excitation," it might also, referring to the result of treatment, be with equal reason termed the "charactéristique d'amélioration."

There can be no doubt also that in many cases the psychical effect is one of the most important factors to be considered.

The effect of a novel form of treatment on impressionable persons must always be borne in mind, and while it probably raises bright hopes of improvement in them, the resulting good done in many instances largely depends upon the confidence or

lack of confidence in the ultimate result which the medical man imparts to his patient.

To minister to the mind diseased is surely part, and perhaps no inconsiderable part, of a physician's duty, and everything which renders him assistance in this work is of importance to him. But it is also important, however, that he should, while dealing with general bodily ailments, realise the means by which the end is attained.

In modern electric methods he finds many valuable means of procedure in the highest degree fitted to appeal to one of man's strongest senses—awe of the unknown. In the hands of quacks and charlatans such methods can be and are exploited with considerable advantage and success, but with such indiscriminate and unscientific prodigality as to cast doubt and suspicion on the power they misinterpret.

Be the remedy never so valuable, it necessarily must have limitations, which only time and the experience of skilled and scientific workers can ultimately fix.

Inordinate and untimely use of such methods of treatment by ignorant or designing persons must inevitably breed mistrust and ultimately perhaps avoidance of what in trustworthy hands proves a beneficial method of treatment.

A clear conception of the possibilities and limitations embraced in each mode of treatment is essential to the capable handling of it.

The alternating sinusoidal bath has its uses—it is scarcely likely to be extensively used.

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NOTES ON THE BACTERIOLOGICAL INVESTIGATION OF THIRTY CASES OF HYPOPYON ULCER OF THE CORNEA

By J. V. PATERSON, M.A., F.R.C.S.,
Assistant Ophthalmic Surgeon, Royal Infirmary
and
W. T. RITCHIE, M.D., F.R.C.P.,
Pathologist, Leith Hospital

(From the Research Laboratory of the Royal College of Physicians, Edinburgh)

THE discovery by Uhthoff and Axenfeld in 1896 that the pneumococcus is the cause of the typical ulcus serpens has, since its announcement, been abundantly confirmed by other observers. The typical ulcus serpens takes the form of a rather shallow ulcer, irregularly rounded in form and central in position, with a yellowish infiltrated spreading margin. The unaffected portion of the cornea is usually somewhat hazy. There is severe iritis with turbid aqueous, and more or less hypopyon accumulates on the floor of the anterior chamber.

Of the thirty cases which we examined, twenty-six might be classed as fairly typical, though varying greatly in severity. Twelve of these cases we have grouped together as severe in type. Of the four atypical cases, one was that of an infiltrated central ulcer in a small boy ; another was a marginal ulcer ; and a third a large shallow ulcer following a corneal abrasion with very little infiltration and the merest trace of hypopyon. The fourth of these cases was one in which the eye was blind from absolute glaucoma, and the cornea already showed degenerative changes.

Twenty-five of the patients were males and five females. This disproportion is, of course, due to the association of the corneal ulceration with antecedent traumatism.

Fourteen of the men were miners, and all gave a definite history of the eye having been struck by a fragment of coal or stone while they were at work. Within a period varying from one to several days, the eye became inflamed and painful. Most of these men were over forty-five years of age. Two patients, who were agricultural labourers, gave a history of the eye having been scratched with a straw, this being a well-known form of corneal injury liable to be followed by severe ulceration.

In two only of the twenty-six typical cases could no definite history of injury be got, and one of these patients worked with cement and was much exposed to the risk of corneal abrasion. The association of the typical hypopyon ulcer with injury appears therefore to be practically constant. An intact corneal epithelium is apparently able to resist successfully the invasion of such micro-organisms as the pneumococcus, even when present in large numbers in the conjunctival sac.

In eight cases chronic dacryocystitis was present with dilatation of the tear sac. The permeability of the tear passages was not tested in any of the cases, and doubtless a more detailed investigation would have shown us that serious defects in this particular existed in a much larger proportion of the cases. In all the cases of dacryocystitis the pneumococcus was present in the films or cultures taken from the surface of the ulcer. The secretion expressed from the dilated tear sac was examined in four cases and showed pneumococci in three. In the other case only xerosis bacilli and staphylococci were obtained from the contents of the tear sac, but cultivations from the surface of the ulcer showed the pneumococcus in abundance.

The danger of corneal infection from a septic tear sac must be very great in the case of workmen who, from their occupation, are much exposed to the risk of corneal abrasions. In two of the cases observed where a double dacryocystitis was present, we had to deal with an ulceration of the second eye, the other eye having already been greatly damaged by previous ulceration. This ever-present danger of corneal infection in such cases has led some surgeons to advocate removal of the diseased tear sac as a prophylactic measure in preference to palliative treatment by probing, etc. Professor Axenfeld (2), of Freiburg, has carried out this treatment in a very large series of cases.

Summary of Bacteriological Findings.

The inoculation from the ulcer, in each of the thirty cases, was made with the sterile platinum loop on to the surface of serum-agar, which was thereafter incubated at 37° C. Films were, at the same time, made directly from the ulcer. As the cautery was employed in nearly all the cases, it was not possible to obtain further cultures at a later date.

The pneumococcus was obtained in nineteen cases, whilst in one further case diplococci, identical with pneumococci in morphological and staining characters, were observed in the film preparation from the ulcer, though xerosis bacillus alone was obtained in the culture. The pneumococcus, therefore, appeared to be the causal virus in twenty cases, or in 66.66 per cent. In twelve there was an abundant and pure culture of pneumococcus; in six cases the pneumococcal colonies, though abundant, were not in pure culture. The pneumococcus was associated with xerosis bacillus in two cases, with Koch-Weeks bacillus in two cases, with staphylococcus pyogenes albus in two cases, and in one case with a diplobacillus.

The colonies of the pneumococcus on the primary media were in every instance typical. Bouillon subcultures were rendered faintly turbid, becoming, after five or seven days, clear with a fine sediment. Gelatine stab subcultures were made in every instance, but in none was growth observed.

The pathogenicity of the pneumococcus was tested in two cases. In one it was not pathogenic for the guinea-pig, and in another case it was not pathogenic for the rabbit. These negative results may have been due to the fact that the serum-agar cultures employed for inoculation were three days old.

Film preparations were made directly from the ulcer in sixteen cases of the series, and in eight of these the pneumococcus was detected.

If we consider the twelve cases classed clinically as severe, we find the pneumococcus almost constantly present, viz., in ten cases. Of the two remaining cases, one showed bacillus pyocyaneus. The other case showed no organisms, but the ulcer had been cauterised three days before admission.

In three cases, Koch-Weeks bacillus was isolated; in one case in pure culture, in two cases in association with the pneumococcus. In one of the latter cases the film made directly from the ulcer contained, besides Gram positive lancet-shaped diplococci, many small extracellular Gram negative bacilli similar to the Koch-Weeks bacillus.

Bacillus pyocyaneus was isolated in two cases, in both in pure culture. This is of interest in view of the same bacillus having been isolated by Gallenga (3), Bietti (4), and M'Nab (5).

A Gram-negative non-capsulated diplo-bacillus, which in sub-culture liquefied the blood serum slope, was isolated in one case in pure culture. The growth was very scanty, and we did not determine whether the bacillus was the diplo-bacillus of Morax-Axenfeld (found by zur Nedden (6) in ten cases, but only once in pure culture), or the diplo-bacillus liquefaciens found by Petit (7) in three cases of hypopyon keratitis.

Xerosis bacillus was found in ten cases. In no instance did the bacilli render bouillon acid, nor could Babes-Ernst bodies be detected after standing by Neisser's method.

A few colonies of staphylococcus pyogenes albus were isolated from two cases.

The only other bacterium found was a diplo-bacillus, obtained in one case. This short, non-sporulating, Gram-positive, aerobic diplo-bacillus was not fully investigated, as it formed only one colony in the primary culture containing abundant colonies of pneumococcus, but the cultural characters of the bacillus on blood-serum and serum-agar proved that it was not the diplo-bacillus (Morax-Axenfeld) nor the diplo-bacillus liquefaciens (Petit).

We did not meet with any case due to *Saccharomycetes* as described by Lundsgaard (8) and Stoewer (9), nor to *streptothricæ* as recorded by Bernardinis (10).

The conjunctiva was examined in twelve cases of the series. Pneumococci were isolated in six cases, twice in pure culture, and abundant. Staphylococci were obtained in six cases, xerosis bacillus in four cases, bacillus pyocyaneus in one case, and in one other case a bacillus identical in all respects with bacillus pyocyaneus, but for the fact that it did not liquefy blood-serum.

We wish to express our indebtedness to Dr George Mackay for the use of clinical material, and to Dr Noël Paton for kindly performing the two inoculation experiments.

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Meetings of Societies

Edinburgh Medico-Chirurgical Society

THE first meeting of the eighty-fourth session was held on the 2nd November 1904—Professor John Chiene, C.B., President, in the chair.

Mr Cathcart exhibited: (1) a patient after operation for fæcal fistula; (2) a case of scirrhus erythema after removal of both mammæ for scirrhus.

Mr Alexis Thomson showed: (1) a boy, aged fifteen, after nephropexy for floating right kidney; (2) a woman, aged twenty-seven, after conservative operation for hydronephrosis; (3) a case of popliteal aneurism treated by excision of the sac, after failure to cure by proximal ligature.

Dr Gibson showed a sarcoma of the root of the left lung involving the pericardium.

Mr Scot-Skirving read a paper entitled, "Questions regarding the sterilising of dressings," which appears on page 369, and he showed a drum which he had devised for sterilising dressings and storing them till required.

Mr Macgillivray, in opening the discussion on Mr Scot-Skirving's paper, indicated the necessity for regular and systematic examination of sterilisers.

Mr Cathcart considered Mr Skirving's new drum more efficient than the drum commonly used, as regards both the sterilisation and the storing of dressings.

Mr Caird said the sterilisers and drums were often too small, and there was thus the danger of dressings being too tightly packed, and consequently not efficiently sterilised. The drum is not necessary, and may be replaced by a wicker basket. As regards the difference of temperature at different levels within the steriliser, this is of no matter, provided that the minimum temperature be sufficiently high to procure sterilisation.

Dr Harvey Littlejohn said that the various methods of sterilisation by heat had been subjected to exhaustive and thorough investigation by public health authorities in this country years ago. The use of super-heated steam for public

disinfectors had been abandoned; whereas saturated steam, let into the steriliser from below, is now in general use. He advocated the establishment of a central sterilising department for the larger hospitals.

Dr Melville Dunlop read a paper on syphilitic synovitis in children. This condition is much more frequent than is generally supposed, and deserves wider recognition than it has received even from recent writers. Dr Dunlop had obtained records of sixteen cases, and he referred to the statistics of other observers. Many cases are probably treated under the belief that the joint affection is of rheumatic or tuberculous nature. And yet it is important that a correct diagnosis be made, because the cases get worse with splints and rest, whereas under anti-syphilitic treatment they recover. The cases may be classified as: (1) synovitis subsequent to epiphysitis, occurring in infants; and (2) true chronic syphilitic synovitis, in which the synovial inflammation is primary. Among the characteristic features of the latter form of the disease are the insidious onset, the chronicity, the symmetry of the affection, and the absence of pain and tenderness The knees are the joints most frequently involved; others may be affected, but involvement of the hip and of the shoulder has not hitherto been recorded. The affected joints are swollen and stiff, yet they are never the seat of any destructive change. Other syphilitic stigmata can usually be detected: keratitis, periostitis, and Hutchinson's teeth are present in some of the cases. Though the pathology of the affection has not been fully investigated, there is in some instances a gummatous infiltration of the synovial membrane. Improvement is obtained under treatment. The administration of mercury and potassium iodide is productive of better results than are obtained by the use of mercury alone. Cases often improve pretty suddenly after having been under treatment for a considerable period of time. After recovery there is a liability to recurrence.

Dr James Carmichael, Dr Norman Walker, and Mr Cathcart took part in the discussion of the paper.

Dr Chalmers Watson read a paper on "Gout—our present position with regard to its etiology." Garrod's teaching as to uric acid being the primary factor in the disease has been almost universally accepted by investigators—for example, by Ebstein, von Noorden, and Roberts. Goodhart and others have of late years questioned this view. Dr Chalmers Watson has confirmed the results of other workers that uric acid may be found in the blood of patients suffering from diseases having no known relationship to gout. Further, an analysis of the urine in acute gout showed no disturbance of uric acid excretion before, during,

or after the paroxysm. The histological appearances in chronic gout in man, and gout in lower animals, do not support the "uric acid theory," but suggest an infective condition. The clinical features of acute gout also suggest the operations of an infective agent.

Dr Watson's conclusions are that there is an infective element in the disease, and that the uric acid is the feature which gives the inflammation its specific character. According to this view, the source of infection is the alimentary tract, and an injudicious dietary acts mainly in virtue of its influence on the bacteria normally present in the digestive tract.

The paper was discussed by Dr Gulland and Dr William Taylor.

Edinburgh Obstetrical Society

THE first ordinary meeting of the session 1904-5 was held on Wednesday, 9th November—Dr N. T. Brewis, President, in the chair.

The following were elected office-bearers for the ensuing session:—*President*, Dr N. T. Brewis. *Vice-President—Senior*, Professor J. A. C. Kynoch (Dundee); *Junior*, Sir J. Halliday Croom. *Treasurer*, Dr Wm. Craig. *Secretaries*, Dr Lamond Lackie; Dr Barbour Simpson. *Librarian*, Dr Haultain. *Editor of Transactions*, Dr Lamond Lackie. *Members of Council*, Dr James Ritchie; Dr J. W. Ballantyne; Professor Jardine (Glasgow); Dr Aitchison Robertson; Professor Simpson; Dr W. Fordyce; Dr Thomas Wood (Leith); Dr Oliphant Nicholson.

Dr Brewis delivered his Presidential Address.

PRESIDENTIAL ADDRESS.

After referring to the continued success of the Society, both as regards earnestness in work and in its financial aspect, Dr Brewis said that in no branch of science had greater progress been made during the last two decades than in that of gynæcology, and that, viewed from its surgical aspect, it had become a perfect speciality. He proceeded to recall the evolution in technique during the past twenty years, and recalled that in the volume of *Transactions* for 1883-4, not more than twenty specimens removed by abdominal section were recorded as having been exhibited; while in the volume of last session upwards of sixty were recorded. In the late Dr Angus M'Donald's record of cases treated in Ward 28, Royal

Infirmary, during the winter 1883-4, only six abdominal sections were shown to have been performed in six months. During the succeeding six months, however, Dr Macdonald had recorded ten consecutive successful laparotomies. Twenty years ago the number and character of ovarian tumours operated upon differed much from those at the present time. At that time the tumours which came to the operator were comparatively few in number, generally of large size and with formidable adhesions. Now their number was legion; they were very often small in size, with adhesions frequently absent, or if present, seldom so intimate as in those of the former period. This was due to the general improvement in medical education and to the consequent early diagnosis and removal.

Tapping of the cyst during ovariotomy was, Dr Brewis considered, the weak point in the operation, and was frequently unsuccessfully performed. The cyst walls were often so thin that they did not grasp the canula, or if the contents were very thick the opening had to be enlarged. In both procedures escape of contents into the peritoneal cavity was the rule, and if the contents were septic or malignant in character, harm might result. Leopold recognised this danger twenty years ago, and advised that whenever practicable the entire tumour should be lifted out of the abdomen unpunctured. It was not always easy to diagnose, even during operation, malignant degeneration of an ovarian tumour, hence all such ought to be removed entire. If, however, the wound or the peritoneum have been soiled by fluid escaped from the cyst, then both ought to be thoroughly irrigated.

Dr Brewis then referred to the great danger of septic infection in operation cases from septic cases treated in the same ward. Each septic patient was a centre of infection, and should be as severely isolated from patients who were free from infection as an infectious fever patient was separated from the rest of the community. He considered that the danger which these putrid cases entailed was not confined to the time of operation, but existed afterwards as well; the danger did *not* end with the closure of the wound. That patients who had been operated on were infected to a certain degree by these cases, was evidenced by the post-operative temperature charts in hospitals. There were frequent rises in temperature, which in the majority of cases, if not in all, were due to infection. Though in most recovery was not interrupted, yet most operators have had cases go wrong and terminate fatally after the simplest and most correctly performed operations. In every hospital where surgical work was done a ward should be set aside for septic cases, completely isolated and worked by a staff of its own. It was

obviously unfair that other patients should, on account of these septic cases, run a risk which was preventible.

The most marked change in technique in ovariotomy during the last twenty years has been the almost complete abandonment of the drainage tube. It has been proved to be unnecessary and even a source of infection. When still employed it is introduced through the vaginal roof.

Then the intraperitoneal method of treating the stump after hysterectomy was first advocated and practised by Schroeder fully twenty years ago. At this time also the operations of oöphorectomy (originally introduced by Battey) and those for the removal of the uterine appendages (introduced by Tait) were being practised with the object of diminishing the size of the growths and of establishing the menopause.

Kelly, in 1888, after treating the stump according to Schroeder's method, fixed it in the abdominal wound and then stretched the parietal peritoneum around it, and his results were good. Stimson, of New York, in 1889, demonstrated that by tying the two uterine and the two ovarian arteries, complete hæmostasis of the uterus could be effected. Milton in January 1890 performed his first operation of supravaginal hysterectomy, and the steps of his operation as narrated by himself were nearly identical with those performed at present, and he might justly claim to have been the first to perform and describe the perfected operation.

This story of the stump illustrated better than anything else the progress of operative gynæcology during the last twenty years. From methods crude and difficult, one of great simplicity has been evolved. The operation was now as easy as ovariotomy, and its mortality was as small. The ease of removing the uterus might even tempt one to perform hysterectomy when it might be unnecessary to do so. The successful removal of an organ was not always a triumph of art, but might sometimes be a confession of defeat.

The radical operation of hysterectomy was not the operation of election for fibromyomata, but was only the alternative when the conservative operation of myomectomy was impracticable. The latter was the ideal operation for fibroids, and should be carried out whenever practicable in women during the child-bearing period. If myomectomy was to succeed as it deserved, tumours must be removed early while they were yet small. The field of conservative surgery found its highest ideal in affections of the tubes and ovaries. Dr Brewis alluded to the severe nervous disturbances and extreme physical discomfort which in some instances followed the artificially induced menopause. Fortunately ovarian functions could be conserved and such

calamitous conditions averted by the preservation of a small piece of sound ovarian tissue, and this might even be produced by a graft of such tissue beneath the peritoneum. In the author's opinion it was in the pursuit of conservatism in surgery that our efforts must be directed in the future. Whenever possible the aim ought to be to remove the diseased tissue and to leave whatever was sound.

After alluding to the improvements recently carried out in the practical teaching of obstetrics, Dr Brewis asked if something could not be suggested as to the improvement in the teaching of gynæcology. He thought that the attendance of students at a course of clinical gynæcology should be made compulsory, and that each student should be examined on the subject in his final examination. He saw no reason why two students should not be attached to each gynæcological bed, as was practised in the medical and surgical wards. And with instruction received at cliniques and in the operating-room, each student would in six months have a fair knowledge of practical gynæcology.

Dr J. W. Ballantyne read a "Note on a Hydrocephalic Infant delivered by Spinal Tapping." The case was that of a woman who, when admitted to the Maternity Hospital, was so far in labour that the child was born as far as the shoulders, but with the head above the pelvic brim. Her previous history was, two living children, and one still-born. The abdomen had been more prominent in the present as compared with her previous pregnancies. Her medical attendant found that the case was a transverse presentation; and after full dilatation of the os uteri, he turned it to a foot case. The feet were easily extracted, but the trunk and arms with difficulty. The head, however, could not be delivered and attempts to apply the forceps were futile. About three hours after version had been performed, she was admitted to the hospital, and was then in a collapsed condition. On abdominal examination, the uterus was found to be of the size of a full term pregnancy, and on vaginal examination a well-ossified occipital bone was felt, with a membranous part behind. The diagnosis lay between hydrocephalus, encephalocele, meningocele, cranial or facial teratoma or a dicephalous monster with a single body. It was decided to treat the case as one of hydrocephalus (which was the most likely condition), and as the child was dead and the mother's condition serious, tapping of the spinal cord was resorted to instead of the more elaborate method of cranial perforation. An incision was made between the 6th and 7th dorsal vertebræ into the spinal canal, but as no fluid escaped, a silver catheter

was introduced along the bended body of the infant into the spinal canal. About 36 oz. of yellowish fluid was thus withdrawn from the cranial cavity, and the infant was then easily delivered. Without the fluid, the child weighed 12 lbs., and the head circumference was 21½ inches. In 1848 this practice of spinal tapping was first proposed by Vanhuevel, and Tarnier actually carried it out in 1868, as it was also by several subsequent operators. The communication was discussed by Professor A. R. Simpson and by Drs F. W. N. Haultain, A. MacVie, J. Ritchie, Berry Hart and W. Fordyce, and the author replied.

Dr Ranken Lyle (Newcastle-on-Tyne) next read some "Notes on an interesting case of Cæsarean Section at full term in a patient with two uteri and two vaginæ." The woman was thirty-one years of age, and had had three abortions in successive years. Prolapsus uteri followed the ultimate abortion and was treated for seven months with a Smith-Hodge pessary. A year later her doctor found her in labour at full term. The os uteri was then the size of a florin, and was displaced forward by an irregular hard mass (the size of a closed fist) immediately in front of the sacrum. An aperient and an enema were given under the impression that it was due to hardened fæces, but with no effect on the obstruction. After the lapse of two hours, as the pains were strong and the head high up in the pelvis, and its advance impossible, Dr Lyle was asked to see the case. On examination, the rectum was found empty and the mass was diagnosed as a fibroid in the pouch of Douglas. As delivery *per vias naturales* was impossible, Cæsarean section was decided upon. On opening into the abdomen, the uterus was found in front. It was opened and a living child with the placenta removed. The wound was closed and the mass being lifted up was found to be a myomatous uterus independent of the other and attached to the top of the vagina on the right side; it had one ovary and tube on its outer side, but none on the inner. There was a reflection of peritoneum from the bladder directly to the rectum between the two uteri. The myomatous uterus was removed by supravaginal amputation, and the patient made a good recovery. The vagina was found divided by a complete septum which was attached below to the vestibule in front and to the perineum posteriorly. At the highest part of each vagina a distinct and separate cervix was found, the case being unique. The President and Professor Simpson made some comments on the communication.

Aberdeen Medico-Chirurgical Society

THE annual address was delivered by the President, Professor J. Theodore Cash, at the Society's rooms, on the 3rd November. After referring to the regretted death of the late Treasurer, Dr W. Findlay, the speaker congratulated the Society on its satisfactory condition, and spoke of the further advantages which were likely to result from the conjoint meetings arranged for with the local branch of the British Medical Association.

The President then proceeded to discuss some points connected with the dosage of remedies.

We find chronicled an astonishing liberality in the prescription of remedies by the ancient physicians.

An instructive paper published in Edinburgh by Dr Milligan some eighty years ago, gives much interesting information on this point. The wise and cautious Dioscorides ordered 62 grains of aloes as a medium purifying dose, or in its place elaterium 10½ grains, or scammony 30 grains. The antidote of Mithridatus had its thirty-five constituents, of which opium formed the forty-third part by weight, so that, calculating from the amount given, no less than 6 grains of opium would go to an anodyne dose. Marcellus ordered 31 grains of aloes as a laxative; Rufus Ephesius, drachm doses of pulp of colocynth. Hippocrates ordered an obolus containing 10.5 grains of elaterium. No doubt is admissible as to the amounts prescribed, as the value of the denarius, the weight quoted, is known.

Are these large doses satisfactorily accounted for on the hypothesis of Arbuthnot, that the prescriptions were written in multiples (probably of four, as suggested by Duncan) of the amounts actually intended to be administered, with the object of concealing the method of treatment; or may it have been that drugs were frequently so inert owing to imperfect methods of preparation and the presence of adulterations, that such large doses were actually required to produce a desired effect? It appears to be unlikely that the ancients had any peculiar tolerance towards remedies. Their physique was inferior to that of the Gauls; and though rickets, struma, and chronic rheumatism seem to have been rare amongst them, their excesses both in eating and drinking would predispose to disorders which would in various ways lessen their resistance.

Our knowledge of the existence, development and separation of the active principles of plants is of comparatively recent growth, the necessity for a standardisation of many preparations has been recognised, and a further extension in this direction is desirable in the interests of exact medication.

As concerning our present system of dosage, an advance

has been made in the latest edition of the "British Pharmacopœia," by the specification for many preparations of a dosage applicable to repeated administration, as well as for a single dose. The question, What is meant by repeated administration? may not admit of an easy answer in every case. Some remedies may be repeated with advantage every 2-3 hours, others not oftener than every 5-6 hours. The speed of absorption and elimination or de-energisation must be considered carefully in this connection. On the whole, the quotations of a summated dosage for a period of time, such as 12 or 24 hours, is likely to be of more use to the prescriber who desires to know what amount of his remedy may be safely but effectively given. To him should be left the distribution of the fractional doses he may elect to use, and the time of their administration.

The German Artznei Buch acknowledges this principle by quoting a "day's dose" for some of the more important drugs and preparations contained in its pages. If we examine the relationship of the day's dose to the single dose, we find that whilst in the majority of cases the summated dose is thrice the amount of the single dose, there are many exceptions to this relationship; thus, for example, whilst extract of opium has a single dose of 0.5 g. and 1.5 g. for a day's dose (×3), strychnine nitrate has .01 g. and .02 g. (×2), and sodium salicylate of theobromine 1 g. and 6.0 (×6) for corresponding employment.

The dynamical properties of individual remedies, and the probable duration of their operation within the tissues, are to be considered in connection with the therapeutical purpose for which they are given. It is quite clear that an uniform system cannot be applicable to all the remedies we employ, and that the stereotyped formula, "take three times a day," may often be amended with much advantage to treatment.

In order to illustrate the variation in effect producible by repeated dosage, two series of experiments were illustrated diagrammatically. The standard chosen was the fall of temperature produced by two alkaloids (A+B) nearly related to one another botanically and chemically. The plan adopted was the following:—After ascertaining the exact lethal proportion of each per kilo body weight for rabbits, a calculated fractional dose was given hypodermically at regular time intervals. The fraction of the lethal varied from $\frac{1}{16}$ to $\frac{1}{2}$, and the time of re-administration from 45 minutes to 4 hours. It was found that in the case of the slightly less toxic body, the elimination or de-energisation occurred more rapidly than in the case of the slightly more toxic alkaloid. With the former, doses of $\frac{1}{16}$ to $\frac{1}{12}$

of the lethal may be followed by a slight summation in effect, when readministration is made every 45 or 60 minutes; but if readministration is at intervals of, or greater than, 90 minutes, the initial effect is neither maintained nor reproduced in extent. Even after a proportion of $\frac{1}{8}$ lethal, there is only slight indication of summation when an interval of 90 minutes is allowed to elapse before re-administration. Should the proportion of the dose be so large as $\frac{1}{2}$ of the lethal, a progressive fall of temperature is observed when re-administrations occur every 45 minutes, and a fourth dose proves fatal; but if the interval is extended to 60 minutes, the same proportionate amount may be given a fourth and even a fifth time, and although a distinct summation of effect is registered, the total fall of temperature is less than that following three administrations at intervals of 45 minutes.

These and other observations made with the body A, were contrasted with more in which B was employed.

As this body is eliminated or otherwise de-energised more slowly than A, greater evidence of summation is observable after doses bearing a small proportion to the lethal, re-administered at short time intervals, as well as of larger proportions re-administered at longer time intervals.

It is probable that the greatest therapeutical advantage would not be derived from an identical method of employing these two bodies A and B in practice. Given a permissible dose for a certain time period, the size of the fraction, as well as its allocation in point of time, would differ.

Such a conception which recognises an individuality in a remedy, is no mere fancy—it is worthy of study as bearing directly upon the most efficient handling of that remedy as a therapeutical weapon. In connection with the prescribing and preparation of remedies, an early and general adoption of the decimal system of weights and measures is highly desirable. In medicine as in commerce, our present chaotic system is a bar to a mutual understanding with other countries, whilst it is a constant difficulty to ourselves. Our Continental neighbours—with the exception of Russia—have adopted the more workable and intelligible system, and there is no probability that they will ever relinquish it.

Our present system as applied to medicine is not merely antiquated but intrinsically bad. As applied to commerce, its operation is well summed up by Lord Lansdowne when he describes it as "distracting to learners, obstructive to trade, and probably advantageous to no one."

There must necessarily be a period of calculation and study for those of us who are accustomed to the older system, before the gramme and the cubic centimetre become usable actualities,

but the period need be but a brief one. Sir Wm. Ramsay assures us that the change to the employment of the decimal system was effected in Germany without any trouble in a week's time, and the Scandinavian countries adopted it with equal ease and celerity. I trust that our next Pharmacopœia will give doses in terms of the decimal system and thus render the transition more easy both to practitioners and students of medicine. One other question affecting dosage is of serious importance.

When the decimal system is adopted and prescribers make daily use of it, by what method shall the patient have his dose measured? To direct that he shall take so many cubic centimetres of the contents of his bottle would probably give rise to much trouble and dangerous misunderstanding, for the system in nine cases out of ten would be foreign to him. To regulate the dosage by the so-called "domestic measures," spoons and wineglasses, would be a serious error, for the capacity of these individually varies enormously, so that their use in most cases is utterly fallacious. Parenthetically it may be stated that the capacity of the tea-spoon may be anything from 40 to 90 minims, so that the patient may receive only two-thirds of his dose, or on the other hand half as much again, according to the resources of his table equipment.

The larger measures are even less reliable. Now, the use of these should be altogether abandoned, and a glass measure, accurate, but of small cost, should be universally employed.

Such a measure might suitably have an eprouvette form, the cylinder having a height of about 20 cm., with a diameter of 2 cm.

On this four graduation marks might be placed, indicating (from the lowermost upwards) capacities of 2.5, 5, 10 and 20 c.c. respectively.

The first might be indicated by the numeral I., the second II., the third IV., as it represents 2.5 c.c. × 4, the uppermost VIII. (2.5 × 8). The patient might recognise these as so many parts, so that when the physician directed 4 parts at certain time intervals, he would measure or have measured for him his 10 c.c. without risks of confusion.

It seems likely that some such method would materially assist the prescriber, reforming his system, and if some recollection of the old nomenclature serves in any way to steady him in finding certain parallels, with the newer standard he could associate the figure I. (2.5 c.c.) with a small tea-spoonful, IV. (10 c.c.) with a large dessert-spoonful, and so on.

By the patient, who would receive an exact instead of a haphazard dosage, the acquirement of a measure for 3d. or 4d. could only be regarded as a good and safe investment; whilst the progress of therapeutic observation would be cleared

of many fallacies which are apt to arise when an æsthetical silver tea-spoon takes the place of its ample brittanic metal predecessor as the trusted domestic measure of the family.

Glasgow Medico-Chirurgical Society

THE second ordinary meeting was held on 4th November—the President, Dr Newman, in the chair. There was a good attendance.

1. Professor M'Call Anderson read notes of (*a*) a case of tubercular peritonitis treated with tuberculin. The patient was a boy of 8 years, admitted last July, with swelling of and pain in the abdomen, some diarrhœa and cough, and free fluid in the peritoneum. The abdomen was prominent and tense. He had twenty-five injections, beginning with 0.75 c.cm. of a 1-1000 dilution of old tuberculin, and rising to 1.5 c.cm. of 1-100. The child gained in weight, the belly became soft and relaxed, and the fluid disappeared. Professor Anderson read notes (*b*) of a case of a married woman, the subject of Addison's disease, who had also been treated with tuberculin. She was admitted in May with much pigmentation of the skin, marked anæmia, breathlessness, and a liability to syncopal attacks. She was 31 years of age, and there was a doubtful tubercular history. The heart and kidneys were normal, and the lungs showed some chronic bronchitis. In the blood there were per cubic millimetre 3,300,000 red cells, and 3800 leucocytes, while the hæmoglobin was 45 per cent. Recognising that tuberculosis of the supra-renals was the commonest pathological condition in Addison's disease, it was resolved to try tuberculin, and the patient reacted to the first injection. She only remained in hospital long enough to have eight injections, but even during that time there was apparent improvement in strength, and the colour got better. The cases were discussed by Drs Robertson, Lindsay Steven, and Adamson, and Dr Anderson replied, stating that he usually used the old tuberculin, as it was much better than the new for diagnostic purposes.

2. Dr Newman described (*a*) a case of movable left kidney leading to acute hydronephrosis from twisting of the ureter; there was complete suppression of urine (said to have lasted 9 days), and recovery. The patient was a woman who was admitted to the Royal Infirmary seven days after an attack of severe pain in the left lumbar region, followed by abdominal swelling, and complete suppression of urine. The patient stated she had made no urine for a week, and she certainly passed none for two days after coming in. Then a little began to appear, and

operation was performed, when the large hydronephrotic sac burst, and was removed. The right kidney, whose function had apparently been inhibited, then began to act freely. Recovery was uneventful. There was no sign of coma during the long suppression. (*b*) Dr Newman also reported a case of movable right kidney with the usual symptoms, characterised by marked respiratory and digestive disturbances. The patient was a woman with a moderately movable kidney, who suffered from time to time from attacks of gastric irritability and of very rapid breathing, the respirations reaching 80 per minute. Being confined to bed for a time, there was an attack of perinephritic inflammation, and the kidney became fixed spontaneously. The attacks, which before had only come on when the kidney was displaced, now ceased. (*c*) A third case reported was one of tubercular disease of the bladder and prostate, with abnormal insertion of the ureter, which contained an impacted calculus. The patient was a man who had suffered from vesical irritation for some time, and pain over right kidney. Pus was present, but no tubercle bacilli at first; the cystoscope showed some swelling at one side of the trigone, and the insertion of the right ureter could not be found. The X-ray photograph was negative. After some time ulcers were found near the trigone, and tubercle bacilli appeared. With rest and helmitol internally the ulcers healed, but eventually broke down, a caseous mass presented itself as if over the prostate, and high up on the bladder wall was seen a little greyish slough. The bladder was opened, when the latter was found to be an abnormally inserted right ureter with a calculus impacted at its mouth. The stone was removed, the tubercular ulcers scraped, and the caseous matter cleared out of the prostate, with considerable improvement. These cases were discussed by Drs Lindsay Steven, Dewar, Caskie, Adamson, Buchanan and Douglas, and Dr Newman replied.

3. Dr Lindsay Steven described a case of acute pneumococci pleurisy, in which the symptoms closely resembled those of an acute pneumonia. The patient was a young man whom he saw in private, in consultation with Dr Gibb of Paisley. The patient fell ill on Sept. 13, with severe pain in the right side, cough and fever; on Sept. 14, there was some tubular breathing and still fever (102°). Two days later there was dulness on the right side, and on Sept. 18 (sixth day of illness), the patient became collapsed. He had the symptoms and appearance of a person suffering severely from the toxæmia of acute pneumonia. Dr Gibb aspirated the chest, however, that morning, and removed a pint of yellow opaque fluid, which yielded an almost pure culture of pneumococcus of

Fraenkel. Dr Steven saw the case the last day, and found the patient dying from a profound toxæmia. Had he not been informed of the tapping he would have put the case down as an acute lobar pneumonia, dying on the sixth day. No post-mortem was obtained. Dr Steven referred to the present position of pneumonia, and said he preferred to consider it an acute specific fever. The pneumococcus need not, however, invade the lung only; it might affect the pericardium, peritoneum, synovial membranes, or, as here, the pleura.

THE third ordinary meeting was held on November 18, in the Ophthalmic Institute, when a demonstration was given by the members of the staff as follows:—

(1) Dr John Rowan showed a number of patients illustrating various phases of interstitial keratitis.
(2) Dr Wright Thomson gave a demonstration of patients illustrating various ocular conditions.
(3) Dr Hugh Walker showed a number of specimens, macroscopic and microscopic, bearing on the pathology of disease and injury of the eye.
(4) Dr Campbell M'Clure demonstrated the micro-organisms occurring in the conjunctival sac.
(5) A number of optical instruments were also shown.

At 9.15 P.M. Dr Maitland Ramsay gave a short account of a case of cephalic tetanus following a wound of the external canthus, and showed the patient; Dr Ramsay also demonstrated a new projection apparatus for showing opaque objects.

Glasgow Obstetrical and Gynæcological Society

THE first meeting of the twentieth session of the Society was held on October 26, when the newly-elected President, Dr J. K. Kelly, took the chair. There was a large attendance. The President, after thanking the Society for the honour it had done him, delivered his inaugural address, taking as his subject "Ectopic Gestation." He did his first operation for this condition in 1892, and since then had had fully 100 cases, so that he spoke from a reasonably ripe experience. Dr Kelly said he preferred the term extra-uterine pregnancy, and said he would define it as the settlement of the impregnated ovum elsewhere than on the endometrium. As a matter of actual fact, the ovum could embed itself on any surface where it could get a good blood supply. For impregnation it was essential that sperm-

cell should travel to germ-cell, and this it naturally did in an inward direction against the outward-borne ovum carried down by ciliary action. Salpingitis, tortuosities of the tube, etc., might favour extra-uterine fœtation, not by presenting a raw surface for embedding, but by retarding the outward passage of the ovum fertilised. But salpingitis is certainly not a necessary antecedent condition. Another theory found the cause of the condition in a reversion to an earlier type, where gestation is usual in the tube. This view is supported by the facts that these animals frequently produce twins, and that twin-bearing is relatively more frequent in extra-uterine than in intra-uterine gestation.

It may be asked, said Dr Kelly, whether the tube needs to be prepared or not? Well, the decidua may be absent in part or in whole, or its formation may follow embedding. In the tube the ovum lies under mucosa, surrounded by muscle; in the uterus, decidua protects the muscle. In the very early ovum we find a layer of syncytium destructive in its effects; given an ovum with syncytium, it can stick in the tube. Whether the tube be healthy or not, it will only support the ovum as long as it can supply it with enough food. The rupture of the tube was formerly thought to be due to distension and thinning, but the tube may give way early when there is little distension. The real explanation probably lies in the corrosive action of the syncytial cells, and this is probably also the reason why early bleeding may occur. With reference to symptoms and physical diagnosis, Dr Kelly said he had little fresh to add. In the pelvis the extra-uterine sac was more likely to be lateral in position as compared with a pyosalpinx, which generally passed behind the uterus. Treatment resolved itself into preventive and active. With the former, as far as the individual was concerned, we could do nothing. In so far as it was a disease of cities and of poorer women, something might be done by improving the national health. As far as active treatment is concerned, it divides itself into two periods—before and after rupture. If diagnosed before, remove at once. The operation-mortality is 1 per cent.; if you wait, 50 per cent. die. If rupture has occurred and the case is seen soon, operate. If seen long after rupture, conservative treatment may be enough. But if there is continual tenderness, uterine bleedings, and rises of temperature, operate by the abdominal route.

At the close of the address a lantern demonstration was given, many of the beautiful slides being from sections prepared by Dr Louise M'Ilroy. Dr Nigel Stark (late President) asked the meeting to give Dr Kelly a very hearty vote of thanks, and this was cordially responded to.

Glasgow Pathological and Clinical Society

THE second ordinary meeting of this session was held on November 14, when Professor Muir, President of the Society, gave an inaugural address on "The Defences of the Body in Disease." There was a large attendance. Professor Muir devoted the first part of his address to the questions of leucocytosis and phagocytosis, discussing certain conditions that affected their intensity. When organisms were introduced into a living body, *e.g.* staphylococci into the peritoneal cavity of the rabbit, they were ingested by leucocytes and many of them destroyed in three hours. This destruction was probably analogous to a process of digestion, and possibly the leucocytes contained ferments. The organism might, however, survive, as in the case of gonococci, inside the cells, and it had to be kept in mind that the blood-serum might be bactericidal without a leucocytosis. The body provided for a supply of leucocytes from lymphoid tissue and myeloid tissue, the former yielding the non-granular, the latter the granular leucocytes. The most important cells in phagocytosis were the polymorphonuclear neutrophiles. Under chemiotaxis these cells migrated from the blood-stream to the tissues, and in yet greater numbers from the myeloid substance into the blood, so that a leucocytosis occurred. Bacteria that caused a local increase in leucocytes also caused a general protective leucocytosis, *e.g.* in suppurative conditions, while the converse also was true ; the typhoid bacillus, for example, having no affinity for the neutrophiles and causing no leucocytosis. Where a leucocytosis usually occurred, its absence was a grave sign, but the converse was not true, for a patient with a leucocytosis might also die. The eosinophiles responded to special chemiotactic conditions, *e.g.* ankylostomiasis, showing emigration and increase like the neutrophiles; regarding lymphocytosis one could not speak so positively. At this point Professor Muir showed a number of excellent lantern slides illustrating what had been said.

The second part of the paper was devoted to a consideration of the ultimate means of defence, the antidotes or bactericidal bodies produced during active immunisation and in disease, and which lay at the root of serum-therapeutics. In general it might be said that organic molecules fell into two classes, those that led to the formation of anti-bodies, and those that did not. The former were all highly complex ; no bodies of known constitution like alkaloids acted in this way. These anti-substances entered into chemical union with the bodies for which they had a specific affinity, and had been classified by Ehrlich into three groups: (1) The antitoxins where a union took place between toxin and antitoxin leading to loss of the latter; (2) the

precipitins where union took place, and where also a portion was separated off, producing precipitation; (3) the lysines, where the specially developed immune body was produced, but which produced no solution effect unless the complement of normal blood were present. These points were illustrated by experiments *in vitro*. Reference was made to Professor Wright's investigations into opsonines—substances in the blood which might not kill bacteria, but affected the leucocytes so as to enable them to do so. In conclusion, the speaker said that the defences of the body were both cellular and chemical, phagocytic and anti-toxic. As regards the source of the latter, many observers considered that they were derived from the leucocytes. The evidence for this was not conclusive, but it was probable this was an important source. It might be that the endothelium of the vessels yielded some, and indeed it was possible that all animal cells shared this power of elaborating them. On the motion of Sir Hector Cameron, a very cordial vote of thanks was accorded Professor Muir for his stimulating address.

Glasgow Southern Medical Society

THE third ordinary meeting was held on 3rd November—the President, Dr James Hamilton, in the chair. There was a good attendance. After the transaction of private business, the President delivered his inaugural address, taking as his subject the therapeutics of disease, with special reference to drugs. For some years past, he said, his mental attitude in this matter had been one of critical scepticism, and he desired to give now a general survey of the whole subject. A young doctor on graduating was largely the slave of his teachers as regards therapeutics, and only after some time did he select his own list of remedies. This list would probably differ very much from that of his neighbour; in the case, for example, of such a disease as pneumonia, four men might select four entirely different lines of treatment, and in each case a happy result might follow. The modern views regarding the etiology of diseases had made it more difficult than ever to see how many drugs could act in any really remedial manner, except perhaps the sera. In actual therapeutics a very great number of remedies were constantly used which were probably of doubtful utility; we had, for example, a large group of drugs classed as astringents, but their utility he considered very slight, and the same might be said of many other groups. The more one reflected upon it, the more it was forced upon one that very few remedies were of certain and assured value. We had quinine for malaria, iron for simple anæmias, and mercury and iodides

for syphilis; their use was secured. Further, but not so reliable, we had salicylates for rheumatism, opium in diabetes, bromides in epilepsy, digitalis in valvular disease, and nitrites in anginous conditions. Of the organic extracts, thyroid was supremely useful, and the value of the diphtheritic serum was proved. But many drugs, old and new, were vaunted, which, he thought, they were better without. He would ask them to hark back to the principles of Hippocrates and of Sydenham, and learn to wait on Nature, not to interfere with her, and he would specially ask them to be more careful and thorough in the routine examination of their patients when first seen. Drugs as curative agents were losing ground, and in many departments of medicine the surgeon was encroaching, treating, and often curing, by the knife, what drugs could not touch. It was to them that the surgeon, however, looked for the early evidence of gastric ulcer, pyloric cancer, ectopic gestations, and appendicitis. If they could not always cure, let them be the leaders in preventive medicine, and let them give the surgeon and other special workers the benefit of their early and thorough consideration of the case.

On the motion of Mr Henry Clark, seconded by Dr Alex. Miller, a very cordial vote of thanks was accorded the President for his address.

THE fourth ordinary meeting of this Society was held on November 18—the President, Dr Jas. Hamilton, in the chair. There was a fair attendance. The evening was devoted to a discussion of "The Cases that Bone-setters Cure." Dr T. K. Monro, in opening the discussion, said that certain cases were certainly cured, others remained in *statû quo*, and the remainder were made worse. The renown of the bone-setter was spread by the cured man, who himself was always proud of having left the beaten track, and unduly advertised the fact when his adventure proved *successful*. The cases that were benefited were old sprains, stiff joints with adhesions, and old fractures with adhesion of the lower bellies of the muscles attached to the bones. It was generally found that in the bone-setter's method a violent wrench was indispensable, the patient felt much pain, and there was the assurance too that something had been out of place and now was "in." Dr Monro referred to Hilton's lectures on "Rest and Pain," and said that possibly they had led practitioners sometimes to delay passive movement too long. This was the bone-setter's opportunity. Another class of cases which he might benefit was that of hysterical joint.

The President, continuing the discussion, said that as far as his experience with bone-setters had gone it was unfortunate

One case particularly he had before him of a lad who had curvature of the spine, for which he was under his care. Not content with the slow progress made in bed, he went to a well-known bone-setter, who told him the spine was dislocated in two places, and stretched it. This was repeated five or six times, and now the patient is again under the speaker's care, just at the point of death for pulmonary tuberculosis, caused, he believes, by the dissemination of tubercle from a focus in the spine.

Dr Leask said his only personal experience of a bone-setter was unfortunate—for the patient. He had put up a Colles in a working man and all was satisfactory. The patient, however, consulted a bone-setter on his own account, and returned home with the end of the radius through the skin. Amputation was eventually required. He did not doubt, however, that a certain number of cases were benefited by the bone-setter's manipulations.

Dr Burgess said he had had the somewhat unusual experience of having been twice in the hands of a bone-setter himself. As a boy he knew such a man well, who enjoyed a great reputation and practice in the north of Scotland. This man had treated him twice when a boy, once for a dislocated toe and once for three displaced metatarsals, and on each occasion did his work very neatly and quickly. He had a special aptitude for this sort of thing, and was very skilful in dealing with a dislocation of the hip. Though he benefited many cases, there were others of course where he did not succeed.

Dr Dunlop reported two cases that had come under his knowledge; one a case of sciatica, which was very temporarily benefited by the bone-setter, and is now as bad as ever; and the other a case of hip-joint disease in a young lady, where a plaster casing had been applied. The patient, on the advice of her friends, visited the bone-setter, who vigorously moved the thigh so that the patient could not only walk, but run. Within a month there was an abscess in the hip; soon after that one appeared at the sterno-clavicular joint, and within four months the patient was dead from pulmonary phthisis.

Drs Wallace, Robertson, Douglas, Forrest and others took part, and Dr T. K. Monro summed up the various points at the end.

Forfarshire Medical Association

THIS Society held an ordinary meeting in the School of Medicine, Dundee, at 8.30 P.M. on November 3rd, Dr Duncan occupying the chair. Mr Greig showed a boy who had suffered from chronic tubercular osteomyelitis of the humerus. Numerous sinuses in arm indicated extensive disease, therefore the whole shaft of humerus was excised. In three to four months a new

one was formed. Ten weeks ago, when he had regained the use of his arm, he fell and fractured his new humerus in the middle of the shaft. Firm union was obtained at the end of six weeks. The specimen of the old necrosed bone was shown. It was specially interesting, as it contained the original shaft lying loose in an encasement of osseous material, perforated in places, corresponding to the sinuses, this appearance suggesting to one's mind a Chinese puzzle.

Dr George Miller (in Dr M'Gillivray's absence) showed a man with emphysema of the right lower eyelid. Emphysema could be easily produced by blowing the nose. It subsided very quickly, showing that a fairly large opening existed in the nasal duct. Cause of the condition, unknown.

Dr Rogers showed a photograph of a child with an enormous occipital meningocele. Operation for removal was carried out, but result was unsatisfactory.

Dr Buist showed photographs of two abnormal mammary conditions: (1) Very marked hypertrophy; (2) supernumerary mammæ in axillæ.

Mr Greig showed stereoscopic photographs of: (1) man with "warty" variety of epithelioma of lip; (2) woman with "warty" variety of epithelioma of anus.

Professor Kynoch exhibited and demonstrated an interesting collection of specimens, the results of various operations:—

(*a*) Three cases of extra-uterine pregnancy: (1) An unruptured sac; (2) a tubal abortion; (3) a ruptured sac. All patients made good recoveries. The last was a severe case, as patient was very collapsed and almost pulseless when first seen.

(*b*) Three cases of tubo-ovarian cysts: (1) Septic; (2) gonorrhœal; (3) tubercular.

(*c*) Dermoid ovarian cyst, removed at seventh month of pregnancy. There were no adhesions, and removal *per vaginam* was easy. An anencephalic fœtus was born a fortnight before time. Labour was uncomplicated.

(*d*) Two large uterine fibroids removed by abdominal hysterectomy. Recurrent retention of urine, and attacks of vomiting being the chief cause for operation.

(*e*) Calculus formed round a hairpin removed from the bladder of an insane patient. Pin was found to project into vaginal wall; it was probably self-introduced.

Mr Greig showed the skull removed from a boy aged 15 who died of broncho-pneumonia, and waxy disease of kidneys. For ten years of his life he had suffered from lupus of face, and other tuberculous skin affections. The lupus had been treated eleven times by spoon and actual cautery. The skin affections had been cured, but the disease had extended into the interior of nose, and

was beyond reach. Examination of the skull showed absence of the nasal bones, alveolar margins of upper maxilla, palate, turbinate bones, hamular process, pterygoid plates, and sella turcica, all being replaced by an overgrowth of spongy bone. The femur, tibia and fibula were also shown from a case where disarticulation at hip joint was performed in a girl, aged 17, for chronic osteomyelitis.

Dr Halley read notes of a case of chronic intestinal obstruction, which will appear in next month's *Journal.*

Births and Deaths registered in Eight of the Principal Towns of Scotland during October 1904

DURING the month of October 1904, there were registered in the towns of Glasgow, Edinburgh, Dundee, Aberdeen, Paisley, Leith, Greenock and Perth, the births of 4063 living children, of whom 2053 were males and 2010 females. These births are equivalent to an annual birth-rate of 27.7 per thousand of the estimated population of these towns. The equivalent annual birth-rate in Glasgow was 30.0; in Dundee, 28.3; in Aberdeen, 28.1; in Leith 27.4; in Greenock, 25.8; in Paisley, 25.1; in Perth, 25.0; and in Edinburgh, 23.3. The births registered in these eight towns are 219 more than in the previous month, but 51 fewer than in October 1903.

Of the total births, 3797 were legitimate, and 266, or 6.5 per cent., were illegitimate. The illegitimate rate was highest for the month in Perth, 9.7, and Aberdeen, 9.4, while it was lowest in Leith, 2.7. In Dundee, it was 8.9; in Edinburgh, 7.0; in Glasgow, 5.9; in Paisley, 5.6; and in Greenock, 3.9.

Deaths registered during the month numbered 2374, which is equivalent to an annual death-rate of 16.2 per thousand. This rate is 0.2 more than that for September, but 0.3 less than the rate for October 1903. The number of deaths during the month was 110 more than in the previous month, but 11 fewer than in the corresponding month of the previous year.

The death-rate for the month was highest in Paisley, 19.1; and lowest in Perth, 12.2. In Greenock, it was 17.6; in Leith, 17.4; in Dundee, 16.6; in Glasgow, 16.5; in Aberdeen, 16.0; and in Edinburgh, 14.5. In Glasgow, Aberdeen, Paisley and Leith the death-rate was higher than what it was in September, while in Edinburgh, Dundee, Greenock and Perth it was lower.

Of the 2374 deaths, 913, or 38.5 per cent., were of children under five years old, and 534, or 22.5 per cent., were of persons of over 60. Deaths under five were 72 more than in the previous month, but deaths of persons of over sixty were 28 fewer.

Deaths of children of less than one year numbered 597; this is 9 more than in September, and is equal to an infantile mortality rate of 139 per thousand births. This rate is 2 less than in September. The infantile mortality rate was for the month highest in Leith, 198 per thousand births; and lowest in Perth, 71. In Dundee it was 149; in Edinburgh, 147; in Paisley, 138; in Greenock, 138; in Glasgow, 134; and in Aberdeen, 125.

The seven principal epidemic diseases were during the month the cause of 233 deaths, which is equivalent to an annual death-rate from these causes of 1.6 per thousand of the estimated population. These deaths are 58 fewer than in September, but 16 more than in October 1903. The death-rate from these diseases for the month was highest in Greenock, 2.9; and lowest in Perth, 0.7. In Paisley, it was 2.0; in Aberdeen, 1.9: in Glasgow, 1.7; in Dundee, 1.7; in Edinburgh, 1.0; and in Leith, 0.9.

There were no deaths from smallpox in these towns during the month.

Deaths from measles numbered 25, which is 10 more than in September. Deaths from scarlet fever numbered 12, which is 1 more than in September. Deaths from diphtheria numbered 28, which is 9 more than in September. Deaths from whooping-cough numbered 83, 9 more than in September. Deaths from fevers numbered 24, which is 6 fewer than in September. Deaths from diarrhœas numbered 61, which is 80 fewer than in September. Of the 24 deaths from fevers, 23 were due to enteric fever, and 1 to typhus fever.

Deaths from influenza numbered 5; this is 1 more than in the previous month, but 4 fewer than in October 1903.

Deaths from puerperal septic conditions numbered 6; from malignant diseases, 132, of which 54 were ascribed to carcinoma, 10 to sarcoma, and 68 to cancers not otherwise specified. Deaths from heart disease numbered 199; from apoplexies, 106; from premature birth debility, 70; and from alcoholism, 11.

Deaths from pneumonia numbered 245, and constituted 10.3 per cent. of the total deaths; those from bronchitis 143, and constituted 6.0 per cent. of the total deaths; and those from phthisis numbered 206, and constituted 8.7 per cent. of the total deaths. Deaths from pneumonia were 85 more than in September, from bronchitis 46 more, and from phthisis 31 more than in that month.

To violent causes 107 deaths were ascribed ; of them 7 were suicidal. Of the suicides, 3 were by cut-throat, 2 by hanging, and 1 each by gunshot wound and poison.

The deaths are recorded of 3 males and 3 females of 90 years of age and upwards, the oldest of them were two widows each aged 94.

The Meteorological Returns for Eight of the Principal Towns in Scotland for the Month of October 1904

Mean barometric pressure, 30.005 inches ; greater than the average for the same month of 1856-1900 by 0.185 inch.
Mean temperature, 48°.5 ; greater by 1°.7.
Mean daily range of temperature, 11°.8 ; greater by 0°.2.
Mean humidity, 84 per cent. ; less by 1 per cent.
Rain, number of days, 15 ; less by 2 days.
Rain, depth in inches, 1.37 ; less by 2.12 inches.
Wind, mean force (on scale of 0-12), 2.1 ; less by 0.4.
Wind, direction of : a 5 days' excess of winds from a S.W. quarter.

HENCE the month of October 1904 was characterised by an extremely high mean barometric pressure ; a high mean temperature, with a mean daily range about the average ; an extremely low mean rainfall, with two less than the usual number of rainy days ; a large excess of moderate winds from a S.W. quarter.

The mean barometric pressure was 30.005 inches, or 0.185 inch above the normal. At Edinburgh the sea-level pressure was above 30 inches on the 2nd, from 8th to 14th, from 18th to 20th, and from 25th to the end of the month. On the 5th a rapid fall of the barometer took place, with sea-level readings below 29 inches and a gale from S.W., and on the evening of the 16th a minor depression occurred.

The mean temperature was 48°.5, or 1°.7 above the normal, the days being 1°.8 and the nights 1°.6 above their respective averages. At all the chief towns there was an excess, ranging from 2.5 at Edinburgh and Leith to 0°.4 at Aberdeen. During the first two weeks, temperature was a little below the average, in the third and fourth it was greatly above, whilst lower temperatures ruled from 29th to 31st, under the influence of easterly winds. From 12th to 14th low readings occurred, with frost in many districts. Highest temperatures occurred generally on 19th or 21st, though Paisley noted its maximum on

6th and Aberdeen on 8th. The absolute maximum for the chief towns was 63°.7 at Paisley on 6th, and the minimum 26°.0 at Perth on 13th.

The mean rainfall was 1.37 inch, or 61 per cent. below the normal, the month being, at least as regards the chief towns, the driest October since observations were organised in 1856. On the East Coast, where there were very few rainy days, much less than half the average was recorded, and in the lower Clyde area about half. Heavy falls occurred on the 5th, and those at Aberdeen and Dundee accounted for about half the total for the month. Heavy falls also occurred on the West Coast on the 16th, Greenock recording 0.91 inch on that day. At Edinburgh there were only 8 rainy days; and of the monthly aggregate of 0.54 inch, three-quarters fell during the first six days of the month.

The weather was unsettled early in the month, and on the night of the 5th a gale from the S.W. was general. A gale also from S.W. occurred in some districts on the night of the 16th.

Editorial Notes and News

Patent Medicines.

THE extraordinary popularity of patent medicines is partially indicated by the fact that the revenue from their sale amounts to no less than £300,000 per annum, but there are many much vaunted quack methods of treatment which pay no Government duty. A more graphic view of the claims which these remedies make upon the public may be obtained from the advertisement pages of any of the popular monthlies. Thus, the current number of a much read magazine contains no less than sixty advertisements of methods of treating disease without a doctor, and the claims made on behalf of many of these would surely, if they could only be substantiated, make any humble-minded physician hide his diminished head. We find, for example, that by means of a simple contrivance, patients can cure themselves in the privacy of their own homes of all afflictions of the eye and ear, such as blindness, granulated lids, cataracts, sore eyes, deafness, etc. This wonderful apparatus, we are told, "not only abolishes the butcheries and tortuous methods practised by oculists and aurists, but at the same time perfects a positive and lasting cure." How long will our eye specialists continue mere blind leaders of the blind?

Diseases of the skin present no more difficulty. For 1s. 1½d. one can obtain a remedy which "will cure any skin complaint."

Coughs and colds, asthma, bronchitis and consumption would also seem to have lost their terrors, as they can all be cured by quite a variety of medicines. While drugs represent the bulk of the advertised methods of treatment, other means of combating disease are many. Sufferers from rheumatism, for instance, instead of upsetting their digestions by taking nauseous medicines, may obtain relief by wearing a rheumatic ring; while a "draft" worn upon the feet will cure gout, lumbago and rheumatism, no matter what part of the body be affected. As the cure is effected in these cases by drawing the uric acid poison out of the system, it appears that certain vexed questions regarding the pathology of gout and rheumatism need trouble Medical Societies no more. Readers who have no diseases to afflict them, or who have found relief from their troubles, may be inclined to give some thought to their personal appearance, and for them we find methods for remedying prominent ears, for altering the shape of the nose, and for developing a figure which will "excite wonder and admiration."

Scraggy and flat-chested damsels by home treatment may enlarge their busts at least six inches, while ladies of too substantial proportions may find comfort in a remedy which quickly "takes off the big stomach," and reduces their weight by 28 lbs. a month, without causing inconvenience in any way. Hair can easily be induced to grow on the head of the baldest man, or to take its departure from the face of his spouse.

Various systems of physical exercise claim attention, and not only promote health, but furnish a useful and interesting occupation for those who have a little time to spare. Others, of a more ambitious temperament, may, by the study of hypnotism, "develop an attractive forceful character," and render themselves "a source of happiness and inspiration to their friends."

What should be the attitude of the medical profession on this subject of quack medicines? That the sick should often attempt to cure themselves without the intervention of a doctor is natural enough, and among the innumerable advertised remedies it may be that a few of the more modest really do deserve a measure of patronage. Probably, however, most readers of this article will agree that it is "monstrous that people should be allowed for their own ends to produce in the public mind a true pathophobia or exaggerated dread of disease, to raise false hopes in the unfortunate sufferers from incurable maladies, and to obtain money from those who can often ill afford it, by holding out illusory promises of cure. If people assert, for instance, that pills containing sulphate of iron and bicarbonate of potash will cure tabes, or that pain in the back is frequently a symptom of renal disease, they are saying a thing which is not

true; and if they sell a remedy on that basis, then if that is not getting money under false pretences, that phrase has lost its meaning. Against such a state of things we ought, as a profession, to protest." These words are quoted from Dr Robert Hutchison, who has republished from the *Lancet* two lectures on patent foods and patent medicines,[1] which contain a great deal of valuable information on these subjects. Dr Hutchison suggests the appointment of a committee or official body of some sort, representing, say, the British Medical Association or the General Medical Council, whose business it will be to inquire into the composition of these so-called remedies and to expose them. In the meantime he thinks doctors should do what they can to educate the public, and in the second place should so improve their own practice that it may never be possible for a patent vendor to say that he has succeeded where a medical man has failed. Medical men evidently have their work before them. So far as education is concerned, however, much more is needed than the profession can undertake. The extraordinary and widespread credulity of the public indicates a state of affairs little creditable to the educational authorities. All classes are affected. As Dr Hutchison says, the so-called cultured classes have a faith in patent medicines and quackery generally which is almost incredible. He might have added that it is to members of the upper classes that many of the most shameless forms of charlatanry of recent times have owed their vogue. As in days of old, for lack of knowledge the people perish; prophets prophesy falsely, and the people love to have it so.

The Age Limit at the Royal Infirmary.

By a majority of nearly three to one the Contributors Board affirmed their original decision to apply an age limit of 65 to all members of the staff. The report of the Committee, which was thus rejected, was not a document which was calculated to convince. It is difficult to believe that the recommendation that every few years the Managers should sit in judgment to consider whether the physician and surgeon were competent for their work was serious, and not simply a plan for tiding over the present crisis and maintaining the *status quo*. At all events, that plan is definitely rejected, for the Contributors Board is in *this* Crisis the "House of Lords."

There is, it appears, some dubiety as to whether this becomes at once operative, and it is understood that the Managers have referred this question to their Law Committee. Whatever be the law, we do not believe anyone contemplated the immediate

[1] John Bale, Sons, & Danielsson, 83-91 Gt. Titchfield Street, Oxford Street, W. 1904.

retirement of the two senior professors who have had such a long and honourable connection with the Infirmary, and we earnestly trust that, in the interests of all concerned, some means, even if a little irregular, will be found for avoiding such a calamity.

But, on the other hand, we trust that the University Authorities will follow the example of the Managers, and in the words of the Lord Provost, "loyally accept the decision of the Contributors." If they do so, we are sure that nothing but good will result, and it is the general opinion that not the least good will accrue to the University itself. There was, we understand, during the earlier negotiations a proposal, which practically allowed the present occupants of Chairs to remain in office up to the age of 70; and the reformers having won their case can afford to be magnanimous, and if not accepting the letter of that proposal, might at least adopt its spirit.

The difficulties of the University have been greatly magnified by those who cling desperately to vested interests. On the Medical side of the Hospital there are no difficulties: it is immaterial whether the student learns his clinical medicine from the same teacher who lectures to him systematically or not. As a matter of fact, those who clerk with the Professors of Materia Medica and Pathology must take another teacher in Medicine, and many who attend the University Systematic Medicine Course do not clerk with the Professor. Midwifery is not taught in the Infirmary, and the Professor of that subject does his Clinical teaching in the Maternity. The present holder of the Chair has often maintained that the subject of Gynæcology should be separated from that of Midwifery, and this separation will probably first come in the recognition of a University Lecturer on Gynæcology on the same footing as those on Insanity, Ophthalmology, etc.

The only real practical difficulty arises over the Chair of Clinical Surgery.

To put the matter bluntly, the Chair of Clinical Surgery has outgrown its usefulness, and when its present distinguished occupant resigns it should cease to exist in that form.

The proposal is no new one. It has emerged in the evidence of more than one Universities Commission, and at the last of these it was formally put forward by one whose loss to the Edinburgh Medical School is ever felt anew in times of difficulty—the late John Duncan. When the whole trend of medical teaching is in the direction of more practical work, it is indeed an anomaly that the Professor of Surgery should not be recognised as a teacher of .Clinical Surgery. The Chair of Clinical Surgery was established (in 1803) when the systematic

lectures on Surgery were delivered as part of his course by the Professor of Anatomy; and although the College of Surgeons appointed a Professor of Surgery in 1804, it was not till 1831 that the Chair of Surgery was instituted in the University. Under such circumstances it is easy to understand the establishment of a Clinical Chair in 1803, and not difficult to understand how once established it was not easy to remove. The present circumstances provide an opportunity which may not readily recur, and we have no doubt that they will be seriously considered by those in authority.

Surgery is, not altogether fairly, regarded as the weak spot in the Edinburgh School. Free Trade in teaching has been the secret of the success of our School in the past; it is only in Surgery that there has been a species of Protection. The ideal, we believe, would be to recognise every Surgeon to the Infirmary as a University Lecturer on Clinical Surgery on the same footing as the Senior Ophthalmic Surgeon, the Surgeons for Diseases of Ear and Throat, and the Physician for Diseases of the Skin. Each lecturer should be allowed to conduct his class as he thought best. It cannot really be seriously contended that two theatre lectures a week are necessary for the proper teaching of the subject; some might prefer to do all their teaching in the Wards; the students would soon find out whose system was best.

Vaccination.

WE have received from the Local Government Board for Scotland a memorandum as to the granting of certificates of successful vaccination, which we reproduce in full.

"In considering the reports made to them by medical officers of health regarding cases of smallpox, the Board have had their attention drawn to cases of children (the majority of whom were under five years of age) who presented no evidence whatever of successful vaccination either in the presence of local scars or in modification of the disease, although said by the parents to have been vaccinated. Similar cases have been observed in the course of the inspection of "contacts." Further inquiry led to the discovery that in many such cases a certificate of successful vaccination had been lodged with the registrar. After investigation of the circumstances under which this occurred, the Board are satisfied that considerable laxity exists in the granting by medical practitioners of such certificates, in respect that they are not always founded on personal inspection of the child after a sufficient interval, and occasionally have even been signed at the

time of the operation, when its result was unknown and when subsequent inspection would have disclosed failure.

"A practitioner who grants a certificate of successful vaccination in such circumstances places himself in a very serious position. The certificate bears that the operation was performed by the person who signs it and that it has succeeded. If in either respect the certificate is false, the signatory is liable to a criminal prosecution.

"The Court regards a certificate of vaccination by a medical practitioner as a matter of public importance. In the case of *The Lord Advocate* v. *Webster*, 27th September 1872, 45 Jur. 3, the judge pointed out that a medical practitioner acting under the Vaccination Act is a public officer with a public duty to perform. 'The medical practitioner is, by that Act, erected into an officer who is to serve the public, and give a certificate of successful vaccination, and that certificate is a permanent document entered on a public register, and is equivalent to a clean bill of health as regards the child. The charge here is that the doctor granted certificates of successful vaccination when he had not successfully vaccinated the children and knew that he had not. . . . This must be regarded as a serious violation of public duty, involving punishment.' The result of the prosecution in that case was that the practitioner, who had granted certificates of successful vaccination though the vaccination had not taken effect, was convicted and sentenced to four months' imprisonment.

"The Board desire to make it publicly known that if in future any case of this nature comes to their knowledge it will be their duty to report it to the Crown with a view to proceedings being taken.—G. FALCONAR-STEWART, Secretary."

We earnestly trust that those members of our profession (we are sure very few) to whom this warning is addressed will give it their serious consideration. We are, as a profession, pressing on the Government the necessity of compulsory re-vaccination. There is heavy and well-organised opposition to this, and our own hands must be clean.

The Supply and Training of Male Nurses.

OUR contemporary, the *Journal of Mental Science*, contains a suggestive note on the above subject from the pen of one of its Editors, Dr Urquhart. He points out that "it is necessary for the adequate nursing of many patients that trained male nurses should be employed, and if that be so, then training schools for male nurses should not be abolished."

The truth underlying Dr Urquhart's statement cannot be gainsaid, and occasions do arise—not frequently, however—when the services of thoroughly trained medical and surgical male nurses would be preferred to those of women. It is an interesting fact that the majority of those who profess themselves to be "male nurses" are men who have been trained in our asylums as attendants upon the insane. In many asylums the medical and surgical training the staff receives, while not professing to be extensive or thorough, is sound and useful, and the public, sane as well as insane, have benefited by the trained attendants that have been sent out by these institutions. The movement in some of our asylums of replacing male attendants, especially in the sick and infirm male wards, by female nurses, and in this way interfering with the supply and training of "male nurses" for private work, is the reason for Dr Urquhart's note of warning. It appears to us that asylums should be encouraged to improve their nursing, and to march in the path of progress undeterred by a side issue such as this; and if it can be shown that a demand exists for a greater number of trained male nurses, it should be the duty of our general hospitals to supply greater facilities for their training there.

Female Nurses for Insane Men.

THE manner in which women have captured the whole field of medical and surgical nursing is in itself a proof that this success is founded on a sound basis. Apart from the special mental aptitude of the female sex for the work of nursing, the returns and the prospects offered by the profession of nursing as a career will never tempt men of the same refinement and education as many of the women who take to nursing. On general principles, therefore, we do not deprecate the recent movement in favour of female nursing in male wards in asylums. If arrangements can be made to avoid danger to the nurses, and sexual difficulties, as has apparently been done with success, there is no reason why at least the sick and infirm men should not be nursed by women, and by women who have received a thorough hospital training, as well as of course special mental training. There is reason to believe that while much has been done in recent years to improve nursing in asylums, much still remains to be done, and the development of the system of employing nurses in the male wards, and of attending women of better social position and education, especially such women as have been disciplined and trained in good hospitals, are both measures in a direction which affords much hope of progress. It is gratifying to us that the Scottish Asylums have not been behindhand in these instructive movements.

Appointments.

Dr Leslie Mackenzie has been appointed the Medical Member of the Local Government Board for Scotland in room of the late Dr J. B. Russell.

Dr Frederick Gardiner was recently elected by the Managers of the Royal Infirmary an Assistant-Physician to the Dermatological Department.

Royal College of Physicians of Edinburgh, Royal College of Surgeons of Edinburgh, and Faculty of Physicians and Surgeons of Glasgow.

THE Quarterly Examinations of the above Board, held in Edinburgh, were concluded on the 2nd inst. with the following results:—

First Examination, Four Years' Course.—Of three candidates entered, the following one passed the examination:—Hormusji Jamshedji Chenoy, Hyderabad.

First Examination, Five Years' Course.—Of twenty candidates entered, the following eight passed the examination:—James Archibald Eadie, Edinburgh; Herbert Irvine, Ireland; Thomas James George, Wolverhampton; George Fitzwilliam Forde, Ballygeany; Francis Wardlaw Milne, Helensburgh; Erhard Rich Petskey, London; Edward Roland Porter, Belfast; and Henry George Ramsbottom, Lancashire; and one passed in Physics, two in Biology, and three in Chemistry.

Second Examination, Four Years' Course.—Of three candidates entered, the following one passed the examination:—Hormusji Jamshedji Chenoy, Hyderabad; and one passed in Anatomy, and one in Physiology.

Second Examination, Five Years' Course.—Of forty-one candidates entered, the following sixteen passed the examination:—Ethel Adelaide Orchard, Australia; Arthur Gordon Jenner, Huddersfield; Oliver David Gunasekara, Ceylon; Charles Nyhan, Co. Cork; Kenneth James Logan Bannerman, Plymouth; Mamanrao Anandrao Vijayakar, Bombay; William Roberts Ellis, Bala; Neil M'Leod, Edinburgh; Leo Murphy, Co. Cork; Hugh Millar, Ayrshire; Ellis Thomas Evans, North Wales; Ada Geraldine Boylette, Bombay; Thomas Alexander Gregg, Ireland; Mary Deborah Hancock, Surbiton; Jalibai Bomanji Engineer, Hyderabad; and Christopher Irvine M'Farlane, Co. Tyrone; and three passed in Anatomy, and four in Physiology.

Third Examination, Five Years' Course.—Of forty candidates

entered, the following twenty-three passed the Examination:—Nena Beatrice Ievers, Ceylon; Henry Ruddock Morehead, Co. Cork; Daniel Kennedy, Cork; Gustavus Herbert Powell, Cork; Leo Patchett, Lancashire; Charles Conway Fitzgerald, Lurgan; Arthur Henley Bloxsome, England; Patrick Raoul Eskell, Port Elizabeth; John Clarke, Ballymena; Ruston Nusserwanji Coorlawala, Satara (with distinction); William Church Mann, Co. Derry; Thomas Mayne Reid Waddell, Tokio; John Lawrence Power, Cork; Krishnaji Waman Dani, Poona; Neil M'Leod, Edinburgh; George Waller Meade, Cork; Daniel Thomas Henry Croly, Achill; Thomas Edward Fitzcroft, Lancashire; Edward Peter Dawes, Longton; Jamseji Pallonji Bamboat, Bombay; Leopold Henry Gill, Gibraltar; James Stirling Macdonald, Cape Colony; and Raghunath Ramchandra Chambal, Bombay; and one passed in Pathology and one in Materia Medica.

Final Examination.—Of eighty-four candidates entered, the following thirty-eight passed the examination and were admitted L.R.C.P.E., L.R.C.S.E., and L.F.P. & S.G.:—Joseph van Someren Taylor, China; Henry Lawrence Ludovici, Colombo; John Roddick Byers, Canada; Stuart Evans, Ottawa; William Murray, Middlesbrough; John Browne Grogan Mulligan, Belgium; James Francis O'Mahony, Co. Cork; Ernest Temple Curran, Ontario; Thomas Cassels, Mangalore; James Patrick Barry, New Zealand; George Galen Bartholomew, Scotland; Carel Theodorus Möller, South Africa; John Michael Moriarty, Ireland; Samuel Mortimer Lyon, Ontario; James Ringland Lawther, Co. Down; Damadar Babaji Mandhle, Bombay; Maneckji Pirozshaw Kerrawalla, Bombay; Colin Garner, Preston; Lilian Mary Grandin, Jersey; James Harvey, Lesmahagow; John Pringle Tolmie, Inverness; Harvey M'Kay, Toronto; Alan Cunliffe Vidal, Eton; Rustom Nusserwanji Coorlawala, Satara; Robert Wilfrid Simpson, Glasgow; James Joseph Egan, Galway; Mohamed Ebrahim Sufi, Lucknow; Rowland Hill Harris, Maine, U.S.A.; Henry Bentley, Manchester; William Dick, Co. Tyrone; John Douglas Staley, Youlgreave; Thomas Alexander Wiltshire Walker, Hyderabad; Edwin Herbert Freeze, Canada; Timothy Archdeacon, Co. Cork; James William M'Ewan, U.S.A.; Walter Longley, Leeds; Kashibhai Vaghajibhai Amin, Ahmedabad; and John Black Moffatt, Airdrie; and ten passed in the division of Medicine and Therapeutics; three in Surgery and Surgical Anatomy; six in Midwifery, and six in Medical Jurisprudence.

Royal College of Surgeons of Edinburgh.

AT a meeting of the College held on the 19th inst., the following gentlemen, having passed the requisite examinations, were admitted Fellows of the College:—Wilfrid Allport, M.B., B.S. Lond., M.R.C.S.Eng., L.R.C.P. Lond., Birmingham; Simon Alexander Ballantyne, M.B., Ch.B. Edin., Abington; Donald Duff, L.R.C.S.E., Glasgow; Harold Dyer, M.R.C.S.Eng., L.R.C.P.Lond., South Croydon; Duncan Campbell Lloyd Fitzwilliams, M.B., Ch.B. Edin., Edinburgh; James Graham, M.B., C.M. Edin., Cockermouth; Donald Alexander Hingston, M.D., Laval, Montreal; Christopher Tredwell Holford, M.R.C.S.Eng., L.R.C.P.Lond., Birmingham; Edwin Henry Irwin, M.B., C.M. Edin., Co. Monaghan; Robert Bathgate Johnston, L.R.C.S.E., Edinburgh; Nicholas John Kalomiris, M.R.C.S.Eng., L.R.C.P. Lond., London, S.E.; James Graham M'Bride, M.B., Ch.B. Edin., Edinburgh; Daniel Sayre Mackay, M.D., C.M.; M'Gill, L.R.C.S.E., Nova Scotia; Mrigendralal Mitra, L.M. and S., Punjab, Calcutta; William Newlands, M.B., Ch.B. Edin., Edinburgh; Robert Ramsey, M.B., Ch.B. Glasg., Glasgow; Athelstan John Henton Saw, M.D., Ch.B. Cantab., Perth, West Australia; Fred William Sumner, M.B., Ch.B. Cantab., M.R.C.S.Eng., L.R.C.P.Lond., Preston, Lancs.; John Charles Venniker, M.D., Ch.B. Durh., M.R.C.S.Eng., L.R.C.P.Lond., London, W.; David Llewelyn Williams, L.R.C.S.E., Edinburgh; and Oswald Samuel Wraith, L.R.C.S.E., M.D. Durh., Darwen, Lancs.

Recent Literature

CRITICAL SUMMARIES AND ABSTRACTS

NEUROLOGY

By ASHLEY W. MACKINTOSH, M.A., M.D.,
Assistant-Physician, Aberdeen Royal Infirmary

KERNIG'S SIGN

KERNIG'S sign now occupies an assured place in the symptomatology of cerebro-spinal meningitis. Its precise diagnostic value is still, however, not clear: within recent years, its presence has been recorded in various conditions and affections, many of which have but a very doubtful relation to meningeal inflammations in connection with which the sign was first described. A valuable summary and analysis of recorded observations on this subject appears in the *Gazette des Hôpitaux*, August 27th, 1904 ("The Sign of Kernig," by P. Sainton and R. Voisin).

As described by Kernig (1883), the sign is elicited by making the patient sit on the edge of his bed, with the feet hanging down: if the sign is positive, one cannot straighten the leg at the knee owing to contracture of the flexors of the knee: if the phenomenon is very marked, one may not be able to extend the leg at the knee beyond a right angle, and, in most cases, the angle reached is not greater than 135°.

This method of eliciting the sign is not usually adopted now, owing to the difficulty and risk of placing a meningitic case in the required position. Any one of three other methods appears to be equally good and does not disturb the patient so much. (1) While the patient is lying flat in bed and all flexion of the legs is prevented, he is asked to sit up: he cannot do so if Kernig's sign is present. (2) The most usual method is to make the patient sit up in bed: if the sign is present, it is impossible to extend the legs fully, however hard one may press on the thighs. (3) Where it is difficult or impossible to make the patient sit up, Osler and others use another method. The patient lies flat in bed: one then tries to flex the leg on the pelvis, keeping a hand on the knee to prevent any flexion there; if Kernig's sign is present, it is found impossible to flex the leg on the pelvis to a right angle.

Some errors of technique must be avoided, otherwise the sign may appear to be present when it really is not. The patient must lie on a level plane and not sink down in bed; he must be placed so that he can sit up easily and without discomfort; he must sit straight, his body not leaning forward or to either side. In cases with marked general rigidity, it may be impossible to examine for the sign.

The term, "Kernig's sign," is usually applied to the phenomenon described in the lower limbs. A condition somewhat analogous may be found in the arms and has been described in certain cases of meningitis: it is here, however, a *permanent* contracture, preventing complete extension of the arms at the elbows and tending to be exaggerated when the patient sits up. Much less is known about this condition in the arms than about Kernig's sign in the legs: it appears to be of rare occurrence. It is not clear to what extent it is strictly analogous to the phenomenon observed in the legs.

The diagnostic value of Kernig's sign.—For some time it was regarded as pathognomonic of meningitis, and its presence was believed to be in favour of epidemic cerebro-spinal meningitis as against the tuberculous form. Later and fuller observations, however, have shown that this sign is neither constant in, nor pathognomonic of meningitis, and that it is probably of no material help towards the diagnosis of the form of meningitis present.

The conditions in which the sign has been found present are thus classified by Sainton and Voisin:—

I. *Acute Meningeal Infections* and *Infectious Diseases.*

(*a*) *Acute cerebro-spinal meningitis* and *tuberculous meningitis.*—Statistics show that the sign is present in more than three-fourths of cases of meningitis: thus Roglet (1900) collected 218 observations and found Kernig's sign in 186, *i.e.* 85.3 per cent. There are no very clear observations as to the date of appearance and disappearance of the sign in the course of a case of meningitis, but several published cases have shown the interesting coincidence of its appearance with the abolition of the knee-jerks.

Kernig's sign, then, has undoubtedly great diagnostic value when there are other indications of meningitis present: it may be of still greater value in some latent, and especially ambulant forms, where it may be the first and only thing to raise a suspicion of meningitis.

(*b*) *Meningeal hæmorrhage.*—Numerous observations prove the frequent occurrence of Kernig's sign in cases of meningeal hæmorrhage, which are now believed to be much less rare than was formerly thought: there is no proof that such hæmorrhage is always related to an irritative lesion of the meninges. In order to distinguish between these two conditions, inflammatory and hæmorrhagic, it is necessary to practise lumbar puncture and examine the cerebro-spinal fluid. French writers specially emphasise the importance of this procedure.

(*c*) *The infectious diseases.*—In these, the presence of Kernig's sign naturally rouses a suspicion of meningitis, and in some cases it is only one of many symptoms pointing to meningitis: but Kernig's sign has been found where there were no other indications of meningitis and where examination of the cerebro-spinal fluid was quite negative.

It is more particularly in *typhoid fever* that the sign has been frequently recorded, *e.g.* in 11.8 per cent. of 313 cases (Netter), 44 per cent. of 50 cases (Carrière). It is worthy of special note that Netter attaches a prognostic significance to the presence of Kernig's sign in typhoid fever, inasmuch as he has found that it occurs most frequently in cases which are grave and which tend to relapse. Thus, the general mortality in typhoid fever is about 7 per cent., while it rises to 25 per cent. in cases which show Kernig's sign: again, relapses occur in 16 per cent. of ordinary cases, in 43 per cent. of cases with Kernig's sign. Kernig's sign has been observed not infrequently in cases of acute *pneumonia*, even when the cerebro-spinal fluid was found to be quite normal: the sign appears to have no bearing on the course of the case. It has also been recorded in cases of *broncho-pneumonia*, *empyema* of pneumococcus origin, *gastro-*

intestinal troubles of infancy, etc.; also in a rare form of *tuberculosis* with subacute course and no apparent affection of meninges.

II. Certain forms of "Intoxication," notably *uræmia*. The sign has also been demonstrated after *spinal cocainisation*. It was also noted in a case of *mitral disease* during the periods of heart insufficiency, while it disappeared completely when the heart recovered its tone (Abadie).

III. *Diseases of the Nervous System*, apart from those of infectious origin. So far, such cases are comparatively few in number and isolated observations. In some, the sign has been observed only on one side.

(α) *Cerebral* affections: a few cases of hæmorrhage and old hemiplegia; one case of abscess, with no trace of meningitis.

(β) *Cord* affections, *e.g.* syphilitic meningomyelitis. In tabes, Kernig's sign has been found to occur simultaneously with an attack of pain and to disappear with the pain.

(γ) Affections of the *peripheral nervous system*, chiefly lumbago and sciatica. Kernig's sign has been recorded in a considerable number of cases of sciatica, even where the cerebro-spinal fluid was found to be normal in every respect. It has been asserted and denied that Kernig's sign is identical with the old observation in sciatica—"Lasegue's sign" of sciatica—that the extended leg cannot be flexed on the pelvis, owing to the pain caused by stretching of the inflamed sciatic nerve.

(δ) *Hysteria.*—Apparently Kernig's sign offers no exception to the general statement, that hysteria may simulate anything.

How is Kernig's sign to be explained? There is general consensus of opinion that it is due to contracture of the flexors of the knee, but how is such contracture brought about? It has been remarked that Kernig's sign is simply an exaggeration of a normal pnenomenon. When a person, stretched out at full length, sits up, he instinctively bends the knees and can extend the legs fully only by an effort of will and not without some discomfort. This is due to the anatomical fact that, in this position, the fibres of the flexors of the knees are stretched to their full extent. The slightest increase in the tone of these flexor muscles will make complete extension impossible, and Kernig's sign is very generally attributed to hypertonus of these muscles. This hypertonus has been explained in different ways:—

(1) It is due to increased tension of the cerebro-spinal fluid. This increased tension has been demonstrated by lumbar puncture in some cases, but in many cases it has been quite absent. Further, such increased tension may be marked without a trace of Kernig's sign—thus it is rare in hydrocephalus.

(2) It is due to an irritative lesion of the cord or its roots.

(α) A local irritation, of inflammatory origin, of the cord and the roots of the cauda equina, *i.e.* secondary to meningitis. This will not explain many cases on record, in which no alteration of cauda equina, spinal cord, meninges or cerebro-spinal fluid has been found.

(β) An irritative lesion of the pyramidal tracts of the cord (Sailer).

(γ) A direct irritative lesion of the cells of the anterior horns, due to certain toxines (*e.g.* those of pneumonia). This is a new conception, which requires further proof—that a primary lesion of these cells, without any implication of the pyramidal tracts, can cause spastic conditions.

In this connection, Sainton and Voisin suggest that lesions of the cells of the cerebrum, rather than those of the cord, may be responsible for Kernig's sign.

(3) Kernig's sign is simply a reflex due to pain. The patient instinctively flexes the knee, when the required position of extension—which causes an elongation of the roots of the sacral plexus as well as of the sciatic nerve—induces a painful irritation of the sciatic nerve, the cauda equina or the cord itself. This view presupposes the existence of a local irritative lesion of the sacral plexus; this has not been found in all cases. Further evidence against this view has been adduced by Abadie. In three cases which showed Kernig's sign, he removed all pain by spinal cocainisation and yet Kernig's sign remained unchanged; further, spinal cocainisation may actually cause the sign.

Sainton and Voisin find objections to each of these views, none of which is wide enough to include all cases. They think that Kernig's sign should be regarded as a reflex phenomenon (with elective localisation), due to various influences acting on the so-called excito-reflex cells of the cord. These influences may come from the periphery (as in sciatica), from the brain (as in hemiplegia), or from local inflammation of the meninges, or from various forms of "intoxication" acting on the cord without necessarily causing true meningitis.

The Effects of Total Transverse Lesion of the Spinal Cord in Man (James Collier, *Brain*, 1904, p. 38).—Since Bastian first pointed out that a total transverse lesion of the spinal cord in man caused abolition of the deep reflexes, the effects of such lesions have been much discussed. It is now generally accepted that a total transverse lesion results in flaccid paralysis, with loss of deep reflexes, beneath the site of lesion. In his important paper, based upon examination of a large

number of cases of complete and partial transverse lesions of the spinal cord in the wards of the National Hospital, Collier goes further and advances the following argument:—"That, as the result of total transverse lesion of the spinal cord in man, not only are the knee-jerks and other deep reflexes permanently abolished in the region supplied by the caudal segment of the divided spinal cord, but, in addition, the muscles waste and lose their faradic excitability, and the sphincters lose their tone, the only sign of self-action remaining in the isolated part of the spinal cord being the occasional presence of certain of the skin reflexes in much reduced degree. These phenomena occur in the absence of any recognisable structural change in the ventral horn cells, ventral roots and peripheral nerves of the paralysed region."

Clinically, a physiological total transverse lesion of the cord may be considered to exist when there is absolute loss of sensibility, complete flaccid paralysis and loss of the deep reflexes —anæsthesia and complete motor paralysis are not sufficient proof of the totality of the lesion. Most important evidence as to whether a lesion is total or not is to be found in the condition of the muscles. When the lesion is total, the muscles become at once flaccid: they waste rapidly and their faradic excitability lessens rapidly at first, then more slowly, and finally it may be lost." The muscular wasting affects all the voluntary muscles supplied below the lesion equally, and it may come to be as severe as that seen in anterior poliomyelitis. Collier adduces evidence, pathological as well as clinical, in support of his view that the muscular wasting, lowering of faradic excitability, and loss of deep reflexes, are the result of isolation of the lumbo-sacral region of the cord from the higher centres, and are not due to concomitant or consecutive changes in the lumbo-sacral region of the cord, as Gowers and others have held. He finds most conclusive evidence in support of his view in the fact, recorded for the first time, that "when the knee-jerks have disappeared in cases of progressive transverse lesions becoming total transverse lesions, for a certain time (a few days) after such disappearance the knee-jerks may be again obtained subsequent to long-continued faradisation of the lower limbs. In other words, the lumbo-sacral centres in man have not sufficient self-action to maintain the muscular tone when severed from the higher centres, but they may be temporarily roused by peripheral stimulation into such a higher state of activity as will allow the knee-jerk to be obtained."

He suggests further that in some cases of flaccid paraplegia of recent onset, the return of the knee-jerks subsequent to faradisation of the lower limbs may have a clinical value, as show-

ing that the lumbo-sacral enlargement and its nerve roots are not implicated in the lesion (*e.g.* a lesion with its upper limit in the low thoracic region).

The *skin-reflexes* appear to be invariably abolished in severe transverse lesions, with the exception of the plantar reflexes: where life is prolonged with a total transverse lesion, "it seems probable that all signs of reflex action slowly disappear."

Collier's observations on the condition of the *visceral reflexes* in total lesions do not accord with the classic view. He finds that, after the occurrence of such a lesion, there may be temporary retention and reflex evacuation: but soon these cease, the orifices become patulous, constant escape occurs, and the bladder slowly contracts so that lavage becomes difficult.

He finds that *trophic* changes are very little in evidence in such cases, and that bed sores do not occur if the skin is properly attended to.

It is impossible to refer in detail to the many other points of great interest and clinical importance, brought out in Collier's paper. One point, however, may be emphasised. It seems clear that complete physiological abrogation of the functions of a transverse area of the spinal cord may exist without actual death of the elements involved, but not for any length of time. In a case of compression paraplegia, therefore, the onset of the flaccid state is a sign which indicates that operative interference for the relief of pressure must not be delayed, if it is to be of any avail. Amongst the series of cases recorded by Collier, complete recovery followed the removal of pressure where the signs of total transverse lesion of the cord had existed as long as seven days.

Clinical notes of fifteen typical cases are appended, with the results of post-mortem examination where it was made.

Hypodermic Injection of Strychnine Nitrate in the Treatment of Progressive Muscular Atrophy (Sanger Brown, *Med. Record*, Aug. 6th, 1904).—It is, perhaps, not so well known as it should be that, in the experience of Gowers, there is one method of treatment capable of arresting the course of progressive muscular atrophy, not indeed in all, but in more than half the cases in which it has been employed. It is the administration of strychnia hypodermically. Frequently, arrest has followed within a month of the commencement of the treatment, and has been permanent; in some such cases strychnia given by the mouth had failed. Gowers recommends the nitrate as "the most convenient" salt, one injection daily, beginning with $\frac{1}{60}$ grain at first, and quickly increasing to $\frac{1}{30}$ or

$\frac{1}{75}$ grain; the injections should be continued for months, with intermissions of a week in every three or four.

Following this method of treatment, Sanger Brown is able to record several cases in which he has obtained highly satisfactory results; within a few weeks the progress of the disease has been arrested, and improvement has become manifest as regards both the weakness and the wasting of muscles. It appears, according to Sanger Brown, that no other form of strychnine than the nitrate given hypodermically is of any avail. For an adult the dose should be $\frac{1}{75}$ grain once daily for six weeks, resumed after an intermission of two weeks, and so on until several courses have been taken. He has not had so good results from larger doses. Other therapeutic measures (*e.g.* massage, electricity, etc.) should be used in conjunction with the strychnine.

SURGERY

By J. W. DOWDEN, M.B., F.R.C.S.,
Assistant Surgeon, Royal Infirmary

THE ANATOMY AND SURGERY OF THE INTERNAL DERANGEMENTS OF THE KNEE-JOINT

THE following is an abstract of a paper by Benjamin Tenney of Boston, on the above subject, in the *Annals of Surgery* for July 1904. It is based on a study of 150 dissected joints and the literature.

The chief reason why the knee-joint is so frequently deranged is the structure of the joint together with the arrangement of the lubricating apparatus, which last may be inadequate, and sometimes an actual obstacle to the working of the joint.

The anterior crucial ligament appeared to be weaker than the posterior crucial, and in 23 out of 40 joints noted, the anterior crucial was joined towards its upper end by some slender fibres from the anterior end of the external semilunar. In 6 joints, a slip passed from the anterior crucial to be inserted with the posterior crucial.

The posterior crucial at its femoral insertion, in 36 out of 40 joints, was joined by a good-sized band from the external semilunar, which was more tense in extension than flexion. A bursa, not as a rule communicating with the joint, may be present between the crucials where they cross. The crucial ligaments limit extension, control the movements of the femur and tibia in the antero-posterior plane, and possibly assist close contact of the joint surfaces in internal rotation.

Tenney considers the semilunar cartilages the remains of

complete inter-articular fibro-cartilages, and in three specimens found the external one complete. The transverse ligament varied, and when attached to one semilunar only, terminated at its free end in a mass of fatty tissue below the patella.

The movements of the semilunar cartilages are entirely passive, and not governed by muscular attachments, as stated by Panzat and others.

The semilunar cartilages assist the opposite lateral ligaments in the limitation of lateral flexion. If the internal cartilage be removed, in the cadaver, the only increased abnormal mobility is when the knee is bent outwards, the external ligaments being insufficient to prevent this. When both semilunars were removed, the lateral movement of the knee was increased from 5 degrees to 15 or more. In full extension little weight is carried on the semilunars unless there be side pressure, but with lateral strain on the joint the semilunar on the side against which the force is exerted becomes of the greatest importance in the maintenance of joint stability.

The internal lateral ligament combats strains which bend the knee inward and also over-extension, it limits rotation of the leg and movements of the internal semi-lunar cartilage.

The long external lateral ligament is separate from the capsule. The biceps tendon in addition to its bony insertion blends intimately with the posterior and outer part of the capsule. Under these two structures is the short external lateral ligament. These external structures resist attempts to bend the knee outwards and limit external rotation. The possibility of the semi-membranous drawing both semi-lunars backward was noticed in 2 out of 16 joints, but this was exceptional.

When the quadriceps is fully contracted, the whole of the articular surface of the patella is raised above the articular surface of the femur. In flexion, the patella is more in contact with the external than the internal condyle, and the inner border may even slip in between the condyles when flexion is marked.

The bursa under the ligamentum patellæ was always present, and though separated by only a thin partition from the joint proper was never found to communicate with the joint.

Lateral ligaments of the patella are described, a strong internal one which passes from the prominence on the internal femoral condyle to the upper part of the patella. The external, when present, passes from the external femoral condyle to the upper third of the external border of the patella. They steady the patella as it slides on the femur and prevent lateral slipping.

Within the joint are several pads covered by synovial membrane, composed of fat, fibrous tissue, and blood-vessels.

The largest is attached to the extensor tendon below the patella, it projects upward between the patella and femur, and backward between the tibia and femur. Contact of this pad with the condyles is maintained by the ligamentum patellæ and ligamentum mucosum. This pad shows a tendency to become lobulated, and these lobules are of two varieties, one fatty liable to form fringes, and covered by synovial membrane, the other tough, fibrous, never frayed or fringed. A pad also exists above the articular surface on the front of the femur; it is in contact with the patellar surface on extension.

Two other small pads are found posteriorly just above the attachments of the semilunars to the posterior part of the capsule.

One function of these pads, besides secreting synovial fluid, seems to be that of "wipers" which keep the synovia spread over the patellar cartilage and condyles.

Experimental injection of the joint was carried out with fluid from a graduated reservoir at 2 metres elevation. The quantity injected varied from 80 c.c. to 200 c.c., and depended on the size of the bursæ and their communication with the joint. About 30 c.c. additional fluid could be injected when the joint was slightly flexed. 30 c.c. always caused floating of the patella.

When the joint is fully extended no other movements are possible, but in slight flexion, and increasing as a right angle is approached, lateral and antero-posterior movement and rotation are possible, which decrease as flexion is increased.

Extension is limited first by the posterior crucial; if it be ruptured the anterior crucial counteracts, and lesion of it allows the strain to fall on the internal and external lateral ligaments. The posterior ligament of Winslow is practically of no value in resisting extension. Flexion is limited by contact of the soft parts. External rotation is limited by the two lateral ligaments. Internal rotation is limited by the internal lateral ligament and anterior crucial in combination.

In external rotation the tibia can slip forward slightly on the femur, but is checked by the anterior crucial first, and then the two lateral ligaments; it also can slip backwards, but is first opposed by the posterior crucial, and then the lateral ligaments. Adduction is possible in external rotation, but is first limited by the external lateral ligament, and then by the posterior crucial; removal of the internal semilunar permits an increase of adduction. Abduction may also occur, and is limited first by the internal lateral ligament, and later by the posterior crucial, while removal of the external semilunar permits of greater abduction, in the cadaver at least.

In the 150 cadaveric joints examined the following internal derangements were found in order of frequency :—

1. Tabs from the lubricating apparatus.
2. Erosion of cartilage.
3. Damaged and displaced semilunar cartilages.
4. Ruptured ligaments.
5. Free and loose bodies.

The catching of the capsule between the patella and femur, or femur and tibia, as described by Hoffa, is doubted, from the study of cadaveric joints at least.

The infra-patellar pad was most often injured. In 100 joints there was some sign of damage. During flexion the edge of the pad nearest the femoro-patellar contact may be caught, and during extension the edge nearest the tibia. The supra-patellar pad might be caught in flexion.

In one joint there was marked loss of articular cartilage and bony contact between the patella and femur, both pads were shrunken and the fat absorbed, and the question arises, was the lesion due to the atrophy of the lubricating tabs? Tough fibrous tabs were seen in 22 joints out of 100, situated chiefly internal to the ligamentum mucosum.

Tabs are considered a much more common cause of trouble than supposed; the only treatment is operation. Erosion of the articular cartilage at the back of the upper surface of the external tibial tuberosity was seen fairly frequently, and in one-third of the joints so affected tough fibrous tissue replaced the cartilage. The theory put forward for this condition is that when kneeling the leg is in a state of inward rotation, so bringing the posterior part of the external tibial tuberosity in contact with the back part of the external condyle. On rising, the weight of the body is borne on the partially raised but fully flexed knee, so giving the maximum of pressure and a minimum of lubrication; this also may account for the stiffness and pain which people who do much kneeling suffer from in the act of rising.

Loss of cartilage on the inner border of the patella was seen, possibly due to kneeling, when the inner border of the patella might be forced into the intercondyloid notch, probably the least disabling of all the injuries.

With regard to the semilunar cartilages, 15 joints showed damage to both, 13 to the external only, and 14 to the internal only. Of these 42 joints, 24 had marks of inflammation or degeneration of the articular cartilage. Where lesion of the semilunar cartilages is present, dryness and consequent friction is almost always present in some stage of the condition.

The first effect of friction is the appearance of fringes, or the semilunars may be caught between the femur and tibia, and split longitudinally, to be afterwards worn down. The ligaments later become damaged by strains from the semilunars wedging the tibia and femur apart. It was impossible to decide whether dryness and friction preceded or followed ligamentous injury. As far as cadaveric experiments went, it seemed most likely that the crucial ligaments, and probably the lateral as well, are torn from their bony attachments more often than in their course. Hints reported thirty-one cases of rupture of the internal lateral ligament, and three of the external without dislocation of the bones.

The experiments of Segond, Bonnet, Poirier, Hoenigschmeid and Pagenstecher on the cadaver, are tabulated as follows:—

Ruptured.	*Increased movement.*
Internal lateral.	Abduction and both rotations.
External lateral.	Adduction and external rotation.
Anterior crucial.	Internal rotation and forward slip of tibia on femur.
Posterior crucial.	Internal rotation, extension, and backward slip of tibia on femur.

When the normal knee is kept in internal rotation the articular surfaces of the femur and tibia are so close that it is impossible to catch the semilunars between the bones. With external rotation and a dry joint the internal semilunar may be caught, but it will not hold unless the internal lateral ligament gives way. In twenty-four undissected joints one showed the internal semilunar caught and held by this manipulation. In the other twenty-three freeing of the femoral attachment of the internal lateral ligament was needed before the cartilage was caught and held.

If the femur roll on the posterior part of the internal semilunar it may only hold it momentarily; but when the ligaments become stretched the condyle may roll behind the cartilage and settle there, consequently the joint becomes locked in flexion and requires abduction, internal rotation and extension to unlock it. The common result of this anterior dislocation of the internal cartilage is that the posterior portion is pushed forward till stopped by the attachment to the internal lateral ligament, and here a bend or transverse fracture occurs. This was seen in twelve out of fourteen joints where the internal cartilage was damaged. The internal cartilage in one case was torn from its capsular attachments, and lay in the intercondylar space. The internal semilunar may also be torn from its

anterior attachment and turned back, due probably to external rotation, with slight flexion of the knee and partial tear of the internal lateral ligament at its tibial attachment.

The external cartilage is, from its freedom and wedge shape, less likely to be separated, but may show at the junction of the anterior and middle third a transverse tear.

As to the treatment of fibro-cartilage derangement, removal is advocated. Schaeffer, and those who have treated the condition with an apparatus which permits flexion while preventing external rotation, limiting extension and lateral mobility, get good results if damage to the semilunar has not occurred; but if it is fractured or torn from its anterior insertion, it is not easy to see how any apparatus can assist. Effusion into the joint follows ligamentous damage, and Lübbe's conclusions are that blood may remain fluid in a knee for twenty-one days or may show clotting after one day. The rapidity of clotting is proportional to the area of synovial membrane injured, and the rapidity of absorption is in inverse proportion to the synovial injury.

The treatment by massage and movement was found by Lübbe in twenty-two patients to result in some thirty-four days' stay in hospital. Where aspiration was carried out, and repeated when needed, the stay was about twenty-five days.

O'Connor's treatment is quoted, the draining of gonorrhœal joints, washing out blood effusions, and arthrotomy and drainage for traumatic effusions. All opened joints are irrigated with 1-1000 corrosive, and drainage continued till normal synovial fluid alone flows.

Four incisions into the knee-joint are described. A U-shaped flap over the antero-internal aspect, and a similar one over the antero-external region. The third incision is made along the anterior border of the biceps with the knee extended; slight flexion permits of the biceps being retracted, and the joint can be opened in front of or behind the popliteus tendon; if it be the latter, it is the most dependent part of the joint as the individual lies in bed. Fourthly, with extended leg an incision along the anterior border of the sartorius will permit of the joint being opened behind the internal lateral ligament. Where a more extensive view of the joint is required, a transverse incision with section of the patellar tendon immediately below the bone will give the maximum of room and the minimum of later inconvenience.

There is an excellent list of references at the end of the paper.

PUBLIC HEALTH

By C. J. LEWIS, D.Sc., M.D., F.R.C.P.,
Lecturer on Public Health in the School of Medicine of the Royal Colleges

Congress of the Sanitary Institute.—The Sanitary Institute, henceforth to be known as the Royal Sanitary Institute, held its 22nd Congress in Glasgow last July. The Congress was divided into sections dealing with Sanitary Science and Preventive Medicine, with Engineering and Architecture, with Physics, Chemistry, and Biology. In addition, conferences of medical officers of health, of municipal representatives, of engineers and surveyors, of sanitary inspectors, of veterinary inspectors, etc., were held, and special meetings were devoted to industrial and school hygiene. Ample accommodation was provided for the Congress in the University Buildings, and additional interest was supplied by the Health Exhibition, and by visits to various sanitary works in or near Glasgow. It is neither possible nor desirable to catalogue here all the various subjects considered at the Congress, but it may be of interest to refer briefly to portions of the proceedings.

(a) *Prevention of Consumption.*—Sir Richard Douglas Powell lectured to the Congress on the prevention of consumption, showing that measures of general hygiene are all of value in the work. Sanatorium treatment is on the right lines, and should be more fully extended by co-operation between local authorities and philanthropic agencies. On the vexed question of notification, the view taken was that a system of voluntary notification is an aid to the medical officer of health in his work, but that compulsory notification is impracticable. The establishment of bacteriological laboratories in all boroughs was advocated, so that the public health departments may assist medical practitioners in detecting disease and may supervise more strictly public places likely to spread infection. The opinion was expressed that hospitals and infirmaries are not doing their share in dealing with tubercular diseases, and that beds should be set apart for advanced cases and also for early cases, which, after diagnosis, could be drafted on to sanatoria.

(b) *The Aerial Convection of Small-pox.*—Professor Glaister, in addressing the Section of Sanitary Science and Preventive Medicine, of which he was President, delivered a very valuable and critical study of the theory of aerial convection of small-pox. The prevention of small-pox is an urgent matter which is at present brought home to all local authorities and rate-payers by the demand for special small-pox hospitals. No doubt so long as present conditions continue, small-pox hospitals are necessary for dealing with the occasional outbreaks which

occur in imperfectly protected communities. Nevertheless, it is unfortunate that public health administration should require the expensive provision of such hospitals, when we know, of our own knowledge and by the experience of Germany, of a more excellent way. It is absurd that a country sufficiently enlightened to adopt vaccination fifty years ago should to-day hesitate to similarly adopt re-vaccination, but should prefer to expend so much money on buildings, which for long periods are unoccupied. According to the doctrine of aerial convection, small-pox may spread from an hospital to surrounding populations in spite of all ordinary precautions, and in addition to the opportunities afforded by the hospital for mediate infection in case of failure of such precautions. Its site should therefore be remote from any large aggregation of people. Adopting this doctrine, the Local Government Board impose, wherever possible, certain restrictions as to the site of such an hospital. Professor Glaister examined critically the influence of small-pox hospitals on contiguous populations. No one denies the aerial transmission of small-pox through short distances as from an infected person to an adjacent uninfected person. But it is more difficult to prove that the disease may be carried from one person to another by aerial convection over distances of a quarter of a mile, up to a mile, or even further. Dr Glaister admits that small-pox hospitals may spread the disease in the neighbourhood, but submits that if they do so, it is more probably due to some failure of complete isolation, to some mediate infection than to aerial convection. It is admitted that cases occur in which no source of mediate infection can be suggested as likely to have occurred. On the other hand, if aerial convection were a regular method of transmission of the disease, it is wonderful that many institutions and populations within its range have escaped infection. Full details are given by Dr Glaister of epidemics of small-pox in which transmission has been attributed to aerial convection over varying distances, and his conclusion is that the doctrine is not proved, and that he himself does not credit it. In view of the frequency of ambulant cases, it is very difficult to exclude the possibility of mediate infection, and only those cases which are inexplicable by any other method should be founded upon as possibly due to aerial convection. Since we find notable authorities assenting to possible aerial convection, and others demurring to its acceptance, we may conclude that further proof is required. What is to be regarded as proof? It will not suffice to include all cases in any district, but only those cases in which no immediate or mediate source of infection can be

traced. Even then, cases may be included which are due to the latter methods of transmission, owing to the immense difficulties surrounding the exclusion of all such possibilities. This selected class of case should proportionally vary directly with the distance from the hospital as a centre, and should also locally vary to some extent with the direction of the winds prevailing at the time. Possibly, also, the occurrence of such cases should be more obvious at certain periods of an epidemic, and when a large number of patients are collected in a hospital as a centre. When the statistics are limited only to cases otherwise inexplicable, it becomes difficult to fulfil all these conditions and to offer satisfactory proof. The nation would be well advised to do away with the necessity for small-pox hospitals by rigid enforcement of vaccination in infancy, of re-vaccination at puberty, and of further re-vaccination in special circumstances. Such circumstances would most probably arise only in the event of imported cases rendering the re-vaccination of contacts imperative. This is the happy condition of things in Germany, where there exist no small-pox hospitals, few cases of small-pox and these imported, and no controversy as to aerial convection. Dr Glaister's paper is well worth the study and attention of all interested in small-pox hospitals.

(c) *Infantile Mortality.*—Amongst other papers submitted to the Congress was one by Dr Templeman, on the causes and prevention of infantile mortality. It was pointed out that infantile mortality has not decreased *pari passu* with the decline in the general death-rate of the country, and that the problem is mainly connected with the larger towns and industrial centres. Notable factors in maintaining a high infantile mortality are, insanitary surroundings, drunkenness, early marriages, deficient feeding of women during pregnancy, and industrial conditions, such as factory life, engaged in during gestation and too early after parturition. Other causes depend upon the ignorance and carelessness of mothers as to the proper feeding and clothing of infants, on artificial feeding with its deadly accompaniment of zymotic diarrhœa, and on insufficient protection from cold. Diarrhœa and whooping-cough are specially fatal to infants, while overlaying, illegitimacy and inherited disease all contribute to raise the mortality. It is obvious that the prevention of a mortality to which so many causes contribute must be carried out on many different lines. Parents must themselves be healthy if their offspring are to have a fair chance of surviving infancy. All measures calculated to render town life more sanitary will tend to reduce infant mortality. Special laws are necessary to prevent

mothers engaging in certain kinds of work during the later stages of gestation. At present the law, often evaded, forbids factory life to a mother within a month after labour, but there is no restriction on such employment up to the very hour of labour. It is suggested that it might be possible to avert, by some scheme of compulsory insurance, any hardship entailed by such new laws. The most hopeful means of speedily reducing infantile mortality lies, however, in improvement in the feeding of infants. The present generation of mothers should be urged to nurse their infants themselves, and Dr Templeman advocates the institution of factory crêches, so that mothers might suckle their infants at stated times during working hours. Municipal milk depots are useful aids in providing pasteurised milk for infants, and in obviating the contamination of milk which is certain in small houses provided with no proper larder accommodation. The appointment of lady health visitors to explain personally to the mothers the proper way to use such milk has been found to be a great help. The visitors are also able to impress upon the mothers the primary necessity for cleanliness, and to teach the essentials of infant hygiene. The local authorities, by minute supervision of the milk trade in all its details, may assist in considerably reducing infantile mortality.

(d) *Sanitation at Sea.*—The sanitary condition of the mercantile marine formed the subject of a valuable paper by Dr Wright, the medical officer to the Port Local Authority at Glasgow. A sea life is generally considered a healthy one, but Dr Wright showed that if the crews of merchant vessels are healthy it is in spite of, and not due to, their surroundings. The accommodation provided for the crew is, as a rule, insufficient, and an authority is needed to supervise the construction of sailors' quarters while the vessel is in the hands of the builders. These parts of the ship are seldom securely constructed, are not properly lighted, and are ill-ventilated. The atmosphere is apt to be vitiated by effluvia from bilge water and from cargo; indeed, the sources of nuisance on board ship are numerous and offensive. The sanitary conveniences are usually abominations, and lavatory accommodation is conspicuous by its absence. Considering that in steam vessels hot water is always obtainable, it should not be impossible to provide a supply even for a bath, and, at any rate, some provision should be made for ordinary washing. The remedy for all these insanitary conditions is to confer powers for the purpose, and Dr Wright suggests that these powers should be given to Port Local Authorities. His paper deserves the earnest consideration of all concerned.

(e) *Other Papers.*—The energy with which possible sources

of ill-health are now being scrutinised was shown by other papers, *e.g.* one by Mr James Henderson, M.R.C.V.S., on "The bacteriological condition of the udder in relation to the health of the community"; and one by Mr Peter Fyfe, describing "What the people sleep on." The former showed the results of a research conducted in the Laboratory of the Royal College of Physicians, Edinburgh, and implicated streptococci, coliform bacilli and tubercle bacilli as responsible for three different types of mastitis. The latter paper disclosed a serious danger to health in the composition of the flock beds so largely used by the working classes. The material of which these beds are composed was found on examination to be very foul and as objectionable as sewage.

The Health Exhibition comprised an enormous variety of sanitary appliances of all kinds, and formed a valuable addition to the attractions of the Congress.

Plague and Rat Plague.—(1) *Methods of Transmission.*—In a research on Epidemic and Epizootic Plague, just issued, by Dr Hunter, the Government Bacteriologist at Hong-Kong, the opinion is stated that the method of transmission of epidemic plague is frequently alimental. This method of transmission has been generally recognised as an occasional occurrence supplemental to the more ordinary avenues of infection through the respiratory tract and the skin. But Dr Hunter goes much further than this, and asserts that it is a common method of infection in Hong-Kong. Cases of the bubonic or of the septicæmic type may arise from alimental infection, but primary pneumonic plague is regarded as due to respiratory infection. The form of pneumonia in the latter case is more extensive and severe, more lobar than the pneumonia incidental to the septicæmic type of the disease. In septicæmic plague, patches of broncho-pneumonia occur in many cases, but probably in these cases the lungs were not first attacked. In support of the contention that food conveys the infection, the writer adduces a variety of evidence. He points out the early occurrence of vomiting and diarrhœa even in bubonic cases, so that the first symptoms of the disease are frequently connected with the alimentary tract. Post-mortem there are always evidences of implication of the gastro-intestinal tract in the form of congestion, hæmorrhages, and pathological changes in both viscera and glands. The Bacillus pestis is always present in the intestinal mucous membrane, in the mesenteric glands and in the fæces. This organism is capable of resisting weak acid solutions such as might be encountered in the stomach, and therefore its access to the intestines with the food is not impossible. Further,

animals may be artificially infected by feeding them on plague-infected materials; presumably, therefore, man might be similarly infected. Finally, food offered for sale has been found to contain the plague bacillus. Water is not found to convey the B. pestis, but rice is a favourable medium for the cultivation of the bacillus, and the organism has, moreover, been isolated from market rice. In brief, this is the case in favour of alimental infection. It may be said primarily that the evidence as to the occurrence of the bacillus in food requires amplification. Most of the foods examined yielded no plague bacilli, it was only from an inferior quality of rice obtained from one source that B. pestis was isolated. Its identity was, however, proved by animal experiment. Therefore it may be admitted as a possible contamination of rice, but, even so, alimental infection is not necessarily responsible for a large share in the spread of plague. The organism can live for considerable periods in grain, milk, fruits and other foods, but there is no evidence that it is commonly found in them. An important omission in the train of evidence is any statement showing that foods commonly eaten raw contain the B. pestis or that rice is eaten by the Chinese without its having been subjected to sufficient heat to destroy the bacillus. Certainly the writer says that the conditions under which the Chinese live and prepare their food for consumption enhance the opportunities for the spread of plague by infected food such as rice. This is not quite conclusive, and it would be advisable to know the temperature reached during the cooking of rice. It is suggested that various animals may convey the bacillus to food, and several interesting experiments are recorded dealing with such possibilities. Such animals as flies, cockroaches, beetles, ants, rats and mice are suggested as probable carriers of the infection to foods. The writer considers that infection conveyed by fleas from the rat to man is comparatively rare, and that the skin is not by any means a common avenue of infection. He points out how seldom in bubonic plague the site of infection through the skin can be located, and yet, in artificial infection of animals through the skin, there is generally some local manifestation produced at the point of inoculation.

Now contrast with this view of alimental infection the equally recent statement made by Dr Klein (Thirty-second Report of the Medical Officer to the Local Government Board) that "in whatever way (subcutaneous or cutaneous) the rat is infected, the abdominal viscera, including the intestines and mesenteric glands, always participate in the disease. For this reason the presence of the lesions in the intestines and mesenteric glands may not be interpreted as due to infection by food."

Hunter regards the spread of the epizootic from rat to rat as generally by means of food tainted with B. pestis, and states that the rat is easily infected artificially in this manner. Klein, on the other hand, says that this method generally failed in his experiments, and he does not regard it as important. Both these observers accept the observations of Galli-Valerio as to the fleas of the rat seldom attacking man, and neither consider that their own experience gives any support to this alleged method of transmission. They discount the importance of fleas as carriers of plague from rat to man or even from rat to rat. Hunter did not succeed in infecting rats or monkeys with plague-infected rat fleas, and Klein describes the facilities afforded in his laboratory for the migration of fleas from infected to healthy rats. Notwithstanding these facilities there was no spread of epizootic plague and Klein thinks that plague spreads from rat to rat by means of infectious discharges such as urine, fæces, oral and pharyngeal mucus and pulmonary discharges. The avenue of infection is frequently the skin, and inoculation may take place accidentally or in fights with infected rats.

(2) *Epidemiology.*—The epidemiology of plague in its relation to rat plague is illustrated in Hunter's report by charts of infected districts in Hong-Kong in 1902 and 1903. The epizootic precedes the epidemic by about ten days or a fortnight. Each reaches a maximum in about six weeks and then declines. While in time the epidemic becomes extinct, the epizootic never entirely disappears. The acute cases of rat plague diminish, but chronic and latent cases exist which bridge over the period until the next exacerbation is due. This exacerbation takes place annually and is explained by the writer as coincident with increase of the young rat population. Young rats are very susceptible to plague, and the virulence of the organism is increased by passage through them. Thus there breaks out a fresh acute epizootic followed in its turn by the epidemic.

Klein suggests that there are two definite types of B. pestis: one, virulent, bred in man; and one, less virulent, bred in the rat. These are distinguishable morphologically and by their cultural characters on gelatine. While the rat is susceptible to both these varieties, it is possible that only highly susceptible human subjects can take the latter infection. Perhaps this may explain the occurrence of epizootic plague unaccompanied by epidemic plague.

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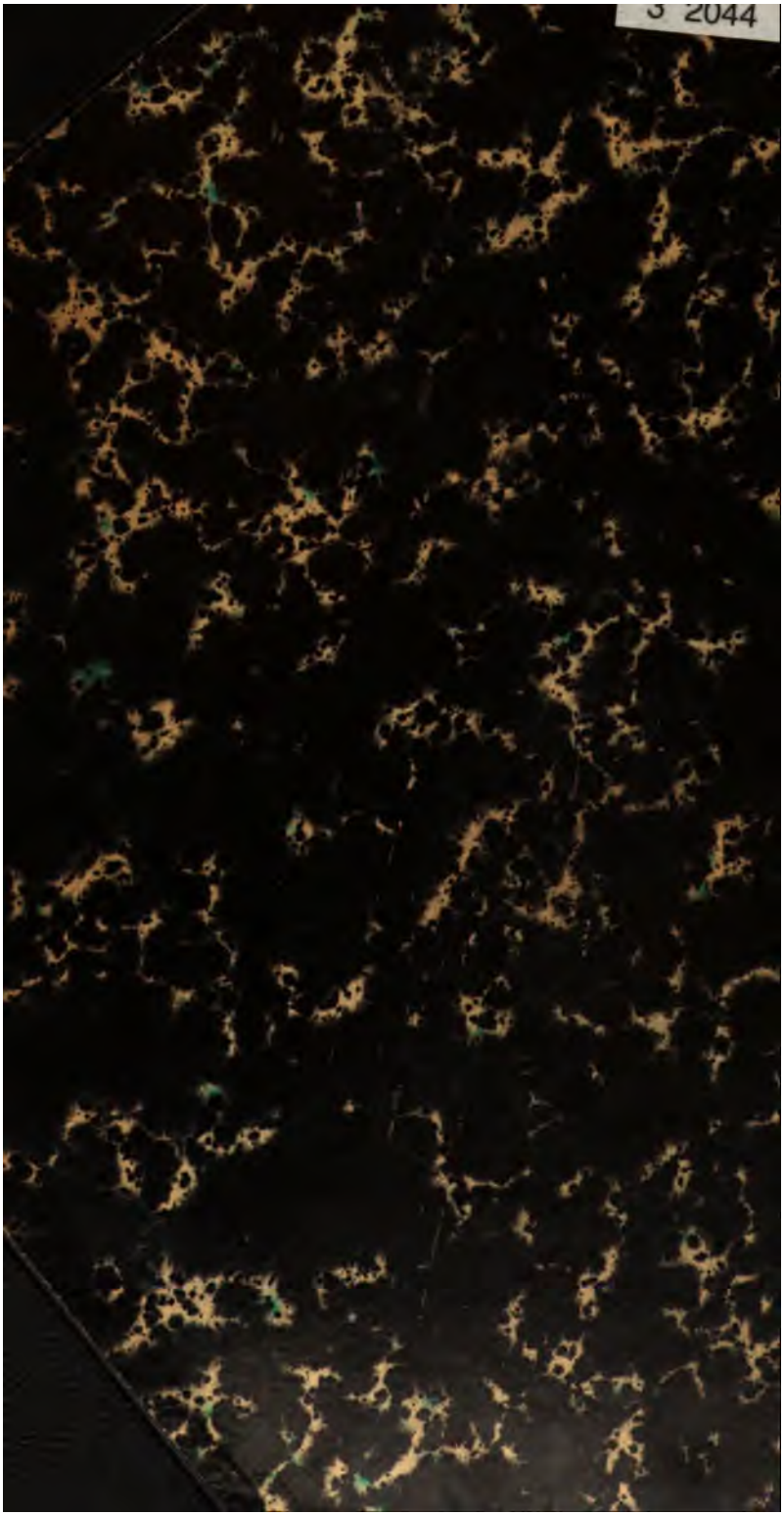
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